OCTOBER 14, 1996 VOLUME 13, NUMBER 42

NetworkWorld

THE NEWSWEEKLY OF ENTERPRISE NETWORK COMPUTING

Server

NetFRAME aims higher. Page 6.

SunSoft glows over Full Moon clustering technology. Page 14.

Sizzle

Industry consolidation shows no sign of letting up

By Jim Duffy

Call it survival of the biggest.

There seems to be no end in sight to the stream of mergers and acquisitions that have reshaped the network landscape over the past few years.

The pace has been set by Cisco Systems, Inc., which has spent $5 billion over three years acquiring a dozen companies — and is expected by analysts to make at least five more deals before year-end.

And just last week, the network industry was rocked by three more acquisitions. Big spender Computer Associates International, Inc. dropped the biggest bombshell of the week, snatching backup management software maker Cheyenne Systems, Inc. for $1.2 billion. Lucent Technologies, Inc. and 3Com Corp. also made big transactions, grabbing switch makers Agile Networks, Inc. and OnStream Networks, Inc., respectively.

Still to be picked from the vine are a host of Gigabit Ethernet start-ups, network edge device makers, and Internet/intranet server management vendors.

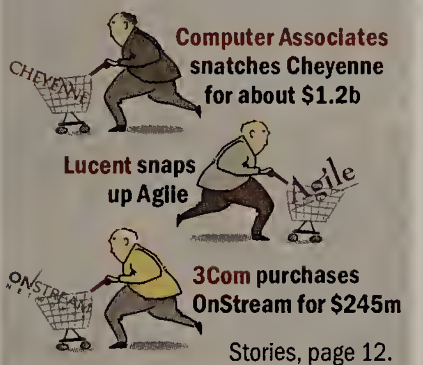
It's gotten to where you can almost hear the big, established players licking their chops as a company starts up.

"We're down to the point of these companies acquiring businesses before they are ever off the ground," said James Swartz, managing partner at venture capital firm Accel Partners in

See **Consolidation,** *page 84*

SHOPPING SPREE

Network industry shaken up as...


CHEYENNE
Computer Associates snatches Cheyenne for about $1.2b
Lucent snaps up Agile
Agile
ONSTREAM NETWORKS
3Com purchases OnStream for $245m

Stories, page 12.

[illegible]

LDAP: diary of a 'Net directory standard

By Christine Burns

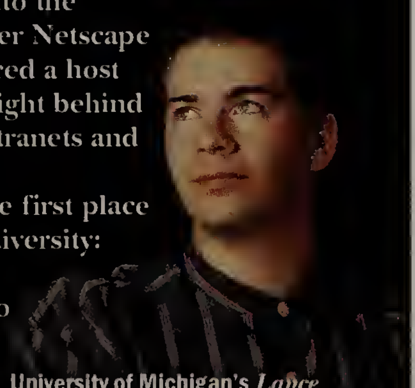
Ann Arbor, Mich.

Although it might seem like the Lightweight Directory Access Protocol (LDAP) has emerged from nowhere, don't tell that to folks at the University of Michigan: They came up with the idea seven years ago.

LDAP was thrust into the industry limelight after Netscape Communications Corp. convinced a host of companies to throw their weight behind it as a directory standard for intranets and the Internet.

Netscape got interested in the first place because of what it saw at the university: 50,000 end users employing an LDAP-based directory service to find each other and TCP IP network resources as well as end users at other organizations using X.500-

See LDAP. *page 82*



University of Michigan's *Lance Sloan is leading an effort to move from a mixed LDAP/X.500 directory service to a pure LDAP one.*

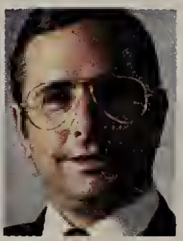
JON MURE AN

Angry Cisco cuts Cabletron cord

By Jim Duffy

San Jose, Calif.

Cabletron Systems, Inc. has a reputation for being the bad boy of the network industry, but this time the company may have gone too far.



Cabletron *prez Robert Levine scrambles to patch things up.*

Angered with Cabletron for what it viewed as a smear campaign, Cisco Systems, Inc. is terminating contracts that allow Cabletron to offer Cisco's widely used Internetwork Operating System (IOS) routing software.

"We've pulled their rights to license IOS," said Alex Mendez, Cisco's vice president of marketing for enterprise networking. "We want healthy competition, but Cabletron has gone beyond that with the things they're doing."

For example, Cabletron has been running print ads in trade publications criticizing the Cisco Catalyst 5000 switch for being a bottleneck in an enterprise network and showing the device stuffed inside a soda bottle. Analysts also say Cabletron has been circulating news clippings about the recent America Online (AOL) net crash, which pinpoint Cisco routers as the culprit.

Cabletron officials say they never engaged in a formal campaign to criticize Cisco based on the AOL incident.

But what apparently irked Cisco most, and prompted the contract termination, was Cabletron's presentation at NetWorld+Interop last month. There, Cabletron showed a vid-

See **Cisco,** *page 84*

Cabletron unveils remote access module at NetWorld+Interop in Paris. Page 6.

Exchange backbone brittle?

Messaging tool fine for desktops, questioned for backbone.

By Barb Cole

Redmond, Wash.

If recent customer deployments are any indication, Microsoft Corp.'s Exchange may have a weak backbone.

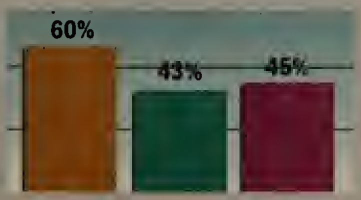
Despite Microsoft's promoting the messaging system as enterprise ready, several Exchange accounts are relying on message switches and directories from vendors such as Digital Equipment Corp., Lotus Development Corp.'s SoftSwitch division and Worldtalk Corp.

Several factors are keeping Exchange off the backbone. For example, the product lacks the following:

- Native support for X.400 and Simple Mail Transfer Protocol.
- Hooks to certain legacy mail systems.

See **Backbone,** *page 84*

HOW ARE THEY USING EXCHANGE?



60% of customers are using it for Internet mail connectivity.
43% are migrating from Microsoft Mail.
45% are using it as the basis of an intranet.

Based on a survey of 250 IS professionals using Exchange. More than one response was allowed.

SOURCE: MICROSOFT, REDMOND, WASH.

Netscape preps super browser

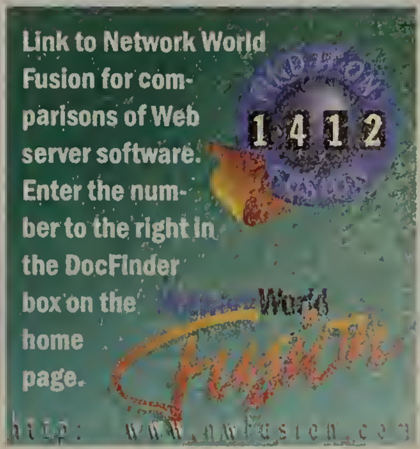
By Carol Sliwa

It's not just a browser anymore.

For Microsoft Corp., a browser is just an element to be ingrained in the operating system. But Netscape Communications Corp. disagrees and this week will announce Communicator, which turns Navigator into a family of tools for groupware, E-mail, authoring, phone calling and, of course, browsing.

The company tomorrow will outline its 1997 "intranet-centric vision and direction" road map. Besides Communicator, the company will disclose additions to its SuiteSpot server line and a new open-arms policy toward key technology from

See **Netscape,** *page 83*



Link to Network World Fusion for comparisons of Web server software. Enter the number to the right in the DocFinder box on the World home page.

NEWSPAPER $5.00

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Access Network World Fusion using the number in yellow. See page 5 for details.

Investment Banks Jump On Public Offering Of Dell Servers

3 of 4 Top Firms Report Improved Network Performance

Wall Street may be feeling a bit queasy, but it's definitely a bull market for Dell.

The Austin, Texas-based computer maker has scored a big hit among some of the largest investment banks with - of all things - its line of PowerEdge servers.

"It might seem surprising," said one source. "When people think of Dell, they think of desktops and portables. But Dell's adherence to open network standards makes their servers a natural on large corporate networks."

It also makes Dell unusual among its competitors, most of whom are only now beginning to abandon their proprietary standards in favor of a more open approach. "I don't want to name names, but companies like Co

‡**Non-discountable promotional price.** †For a complete copy of our limited warranties, please write Dell USA L.P., 2214 W. Braker Lane, Suite D, Austin, TX 78758. ★Prices and specifications valid in the U.S. only and subject to change without notice. Microsoft, Windows, Windows NT and the and the Intel LANDesk logo is a trademark of Intel Corporation. 3Com is a registered trademark and the 3Com Network Ready logo is a trademark of 3Com Corporation. ^On-site service provided by Digital Equipment Corporation and is available in 29 metropolitan areas. For more information call Dell's TechFax℠

The following could be considered insider information. Run with it.

- Dell is ranked fifth in US server market share
- Dell servers are built in a dedicated ISO 9002 server factory
- Mission-critical server support is provided 7 x 24
- 5 of the top 6 software makers buy Dell servers
- 92% of Dell's $5.8 billion revenues come from businesses and government agencies
- 5 of the 6 largest automobile makers buy from Dell
- 4 of the 5 largest mutual insurance companies buy from Dell
- 5 of the Big Six accounting firms buy from Dell

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- 7 x 24 Dedicated Server Hardware Technical Support

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Product Code: 200145

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180MHz PENTIUM PRO PROCESSOR

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- 128MB ECC EDO Memory (256MB Max.)
- Integrated Adaptec 7880 PCI Ultra/Wide SCSI-3 Controller
- Three 4GB Fast/Wide SCSI-2 Hard Drives
- 8X SCSI CD-ROM Drive
- 3Com 10/100 PCI Ethernet Adapter
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"The secret of success in business is to know something nobody else knows."

"If audio quality is all that counts, Nuera's Access Plus F100 is clearly the product to buy."
Data Communications, September 1996

Nuera Rated #1 in Quality of Voice Over Frame Relay*

Back in January of this year, when Nuera Communications was publicly introduced as a new company, created with the people, products and technology formerly responsible for the success of PCSI's Clarity Products division, we suggested that "The secret of success in business is to know something nobody else knows." Some people didn't know what we were talking about. Now they do. Very recently, Nuera was recognized in independent laboratory tests as having the highest quality, lowest delay and best bandwidth utilization of any Voice Over Frame Relay Access Device tested.* Period.

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*Testing conducted by National Software Testing Laboratories, September, 1996

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Contents

NetworkWorld Fusion
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This Week

News+

- **The industry:** Link to an online discussion about Cabletron finances and read how Cabletron CEO Craig Benson considered running for U.S. Senate or New Hampshire governor this year over deregulation of the electric industry. And read up on the latest acquisition news in the networking biz. **Cabletron DocFinder: 1411. Acquisition DocFinder: 1413.**
- **Directories:** Read an LDAP primer, look up available LDAP servers and clients, and see how vendors are getting behind this directory protocol. **DocFinder: 1407.**
- **E-mail:** Read an article on Microsoft's efforts to take on Notes and SMTP servers for control of the enterprise backbone, see why some shops are chosing SMTP over X.400, and get recommendations on writing an RFP for an enterprise messaging network. **DocFinder: 1409.**
- **Server clustering:** Get a technology overview of SGI's new Origin server clusters and download our guide to buying clustering technology. **DocFinder: 1402.**
- **Data warehousing:** Read papers on data modeling and primers on data warehousing. **DocFinder: 1401.**
- **Distributed objects:** Grab a paper that discusses the issues surrounding the linking of CORBA objects with Web servers and browsers. **DocFinder: 1404.**

NetRef

- **NOSes:** Read our review of Windows NT Server 4.0 (page 43), then come online to read our recent review of NetWare 4.11 and our comparisons of NT, NetWare, OS/2 Warp and VINES. **DocFinder: 1403.**
- **WANs:** Don't be aFRAD. Download a copy of the Tolly Group's detailed report on frame relay access devices. **DocFinder: 1408.**

HOW TO GET ON TO NETWORK WORLD FUSION

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NetworkWorld Fusion

CONFERENCE PICK

Scott Bradner takes issue with our recent series on Internet troubles (page 46). What do you think about the state of the 'Net? Select Forum, Columnists then Bradner.

News

6 **NetFRAME rolls out** clustering solution for NetWare.
8 **IBM product announcement** to revitalize net plans.
8 **Microsoft promises** a fix for DCOM's registry.
10 **MCI extends ATM** across globe for customers.
12 **3Com and OnStream** enter ATM marriage.
12 **Lucent acquires** frame and cell switching infrastructure.
14 **Cisco and Bay round out** their hub and switch lines.
14 **Lotus' Organizer 97** to be accessible from Web browsers.
14 **Full Moon aims** to take bite out of Wolfpack.

WANs & Internetworking

17 **Interlink pumps up** its mainframe TCP/IP software.
17 **NetEdge line embraces** voice and Fast Ethernet.
17 **Defense Department moves** to ATM.
18 **SunSoft rolls out** intranet management products.

Carrier Services

23 **AT&T fills in** electronic commerce platform.
23 **Cross-ISP roaming** solution on deck.

Local Networks

27 **Silicon Graphics puts** building-block servers into play.
27 **Sun's Ed Zander says** Unix has plenty of fight left in it.

SPECIAL FOCUS

Network operating systems

Dealing with the complexities of mixed NOS environments. Page 32.

Client/Server Applications

37 **Chip maker jumpstarts** data warehouse efforts by buying a data model.
37 **Documentum Web-ifies** doc management software.
37 **CommTouch to make name** for itself in 'Net mail.
40 **PeerLogic gets patent for** object technology.

Intranets & the 'Net

45 **CORBA-based apps not ready** for prime time.

Technology Update

49 **Internet/intranet craze brings in** new crop of messaging standards.

Management Strategies

70 **Sifting through** potential net manager candidates requires a crash course in personality typing.

THE BIG SWITCHEROO

Tolly

Bradner

NW would like to welcome aboard our new biweekly WAN columnist Kevin Tolly, president of The Tolly Group. Scott Bradner fans will be pleased to note that his column has moved to the Intranets & the 'Net section and will double in frequency, giving you a dose of Bradner every week.

Opinions

20 **Kevin Tolly** sorts through the token-ring switching options.
30 **Dave Kearns** says a year after the Microsoft-Intuit deal fell through, Bill Gates & Co. are still making their presence felt in electronic commerce.
44 **Daniel Blum** says Novell may have what it takes to make the messaging market a three-horse race.
46 **Scott Bradner** gives a second opinion on the Internet's health report.
52 **Editorial:** The past as prologue.
52 **Anura Gurugé** says SNA users have to learn to live in a TCP/IP world.
53 **Ira Brodsky** tells the FCC to mind its own business.
86 **Dave Buerger:** New encryption export policy is a cruel slap in users' faces.
86 **Mark Gibbs:** Professor Gibbs online: marketplaces, trade shows and dialogues.

Features

Framing it up right: *A guide to choosing the frame relay access device that best fits your traffic mix. Page 55.*

Review: *NT Server 4.0 hits a pothole on its way to the enterprise. Page 63.*

Network Help Desk. *Page 49.*
Message queue. Letters to the editor. *Page 53.*
Editorial and advertiser indexes. *Page 81.*

NetworkWorld's *Mission: To provide news and analysis that help network IS professionals deliver the network computing infrastructure and distributed applications required to meet evolving business needs.*

News briefs, October 14, 1996

Executive shift at Lotus

Zisman

Papows

■ Lotus Development Corp. last week named Jeff Papows as its president after Michael Zisman stepped down to become executive vice president for strategy. Previously, Zisman and Papows shared the office of the president with unusual [illegible] with Zisman as chief executive officer and Papows as chief operating officer. Though the job of running Lotus on a day-to-day basis is shifting, observers said Zisman will continue to be a driving force at the company. Zisman, credited with redesigning Lotus in its messaging strategy, joined the company in 1994 after the acquisition of Soft-Switch, Inc., of which he was president and founder. Zisman told Lotus employees in a company memo last week that personal obligations resulting from a death in his immediate family require him to move into the new post.

Yahoo thrown for a loss

■ Internet pioneer Yahoo, Inc. last week reported a loss of $1.14 million for the third quarter that resulted largely from heavy investments made to expand the Santa Clara, Calif., company's 'Net search service. While the loss is more than twice that reported in the third quarter of last year, the company reported revenue of $5.51 million for the quarter, up from $298,000 in the second quarter last year. The company also increased its number of advertisers from 270 in the second quarter to 340 in the third quarter.

An overnight 'Net success?

■ *Federal Express Corp. last week joined the race for a piece of the burgeoning electronic commerce market by unveiling products and services for conducting business over the Internet. The company introduced free software, called FedEx BusinessLink, that will enable companies to set up Web sites from which customers can order products electronically and have them shipped via FedEx. The company plans to introduce additional services, including order entry and confirmation, inventory management, invoicing and after-sale service for returns and repairs.*

Campaigning for the Internet

■ *Vice President Al Gore last week said the White House will include $100 million in its January budget proposal for research and development on what it calls "The Next-Generation Internet." This network would link universities and laboratories at very high speeds to test multimedia applications and bandwidth reservation technologies. The White House hopes the research funding may eventually reveal ways to overcome today's Internet slowdowns.*

MSN: It's back

■ *Microsoft Corp. is giving The Microsoft Network (MSN) another shot, energizing the online service with a Web browser-based interface and enough entertainment programming to merit creation of its own Internet production studio. The new MSN will be launched Nov. 1 for Windows 95 customers.*

BBN Planet?. . .Hello? Anybody out there?

■ *A power outage in Palo Alto, Calif., knocked some 406 BBN Planet Internet customers off the 'Net last Friday. Power went out on the Stanford University campus, where BBN Planet has a point of presence, Thursday evening. The POP has backup batteries, but they drained after two hours. The power came back on, but then went dead again Friday morning. Late Friday afternoon, BBN Planet brought in an emergency generator to restore the POP, which hosts sites from organizations such as the Chicago Tribune and InfoWorld, according to a spokesperson. Some Internet users reported difficulties getting to other nearby sites; for example, Sun Microsystems, Inc. seemed to disappear from the nationwide Domain Name Server system for a period on Friday.*

Everything's coming up clusters

NetFRAME steers clear of its traditional proprietary role, rolls out high-end server.

By John Robinson
Milpitas, Calif.

NetFRAME Systems, Inc. next week will launch a high-end server that includes hardware for clustering I/O devices and software for clustering NetWare servers.

The ClusterSystem 9000 (NF9000), a Pentium Pro-based server designed for four-way symmetric multiprocessing (SMP), is the first in NetFRAME's line to include support for standard I/O devices.

Previous servers in the NetFRAME family supported only proprietary I/O devices, preventing customers from using standard PCI cards and storage systems.

To facilitate the clustering of I/O devices, the server includes three PCI buses — one more than many four-way SMP servers. With two PCI buses, slow-speed devices are traditionally put on one bus and high-speed devices on the other. With a third bus running the slow-speed devices, the other two can split the high-speed devices in a failover configuration.

The buses are bridged to as many as four electrically isolated canisters, each containing four PCI slots for Ethernet, Fast Ethernet, token-ring or FDDI connections. Because they are isolated, PCI cards can be hot-swapped and positioned in a failover configuration.

Rob Sakakeeny, an analyst with Aberdeen Group, Inc. in Boston, said the NF9000's standard I/O support should entice new customers that feared NetFRAME's proprietary architecture in the past.

"There's really two stories here," he said. "They are adopting the standards, which is good, and they have put together a nice implementation of a [NetWare] cluster."

The NF9000 includes a new hardware device called IntraPulse, which monitors internal server workings such as temperature and fan speed.

The new clustering software, dubbed ClusterData, works with Novell, Inc.'s Novell Directory Services (NDS) to enable one NF9000 running NetWare to pass its work over to another one in the event of a failure. ClusterData identifies a predefined redundant path, routing a client request through an alternate server to retrieve data if the primary server fails.

Alone, the NF-9000 can run NetWare or Windows NT. Since the ClusterData software now works only with NDS, Windows NT systems cannot be clustered until Microsoft Corp. releases a robust directory service of its own next year.

The NF9000 also includes a new hardware device called IntraPulse, which monitors internal server workings such as temperature and fan speeds. IntraPulse works with management software to alert administrators of a device failure.

A basic NF9000 configuration of one CPU with 64M bytes of memory and four PCI slots is priced at $25,000. A fully loaded rack with 20 drives, 16 slots and four-way SMP is priced at about $130,000.

☎NetFRAME: (408) 474-1000.

Cabletron arms high-end switch with remote access module

By Jodi Cohen
Paris

Cabletron Systems, Inc. last week gave attendees at the European version of NetWorld+Interop 96 a sneak peek at the first remote access module for its top-of-the-line switching hub.

The unannounced module, code-named Willow, will be part of the CyberSwitch line of remote access products, which Cabletron formally introduced last week.

The initial CyberSwitch products — a collection of standalone devices for large customers, carriers and branch offices — represent Cabletron's first such offerings.

"We know that there is a substantial backlog for remote access products in the compa-

See **Cabletron,** *page 85*

REMOTE ACCESS ROMP
A sampling of Cabletron's CyberSwitch (CSX) line:

Product	Description	Price
CSX 7000	16-slot central-site switch	$13,000
CSX 6000	8-slot branch office switch	$9,995
CSX BRI-4	ISDN Basic Rate Interface card for Model 6000 or 7000	$3,000
CSX PRI	ISDN Primary Rate Interface card for Model 6000 or 7000	$4,500
CSX DIG	8 digital modem card for Models 6000 or 7000	$6,000
CSX 1200	Remote access bridge/router with ISDN interfaces	$4,240 to $7,000
CSX 400	LAN/WAN Ethernet gateway	$5,105
CSX 200	10Base-T remote access hubs	$4,090 to $4,240
SecureFast VRA Manager Server 1.0	Windows NT-based switch management tool	$4,995

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News analysis

IBM trying to deliver network wakeup call

By Michael Cooney
Raleigh, N.C.

IBM's networking hardware group is knocking at the corporate network door, but is anybody listening?

IBM's Hahne *says Big Blue will lead SNA users into the future.*

The division last week unleashed a wide-ranging 30-plus product barrage. Taken together, the products are designed to win back the hearts and minds of those internetworking accounts IBM has lost in the past few years. IBM hopes to woo those customers with new, more powerful tools for migrating legacy networks to ATM and frame relay-based switched enterprises.

These new products include branch office routers, LAN switches, wide-area access devices and the applications to manage the whole shebang from industry standard platforms. For its existing products, IBM added new switching capabilities, higher performance processors and adapters, and features that will let users migrate existing SNA nets to new switched devices.

The announcement comes near the end of a year in which IBM has broadened and reshaped its networking scope by joining the Gigabit Ethernet Alliance and buying or partnering with a variety of industry players — from Tivoli Systems, Inc. and Xylan Corp. to Cascade Communications Corp. and Sync Research, Inc.

It is also a year in which IBM Chairman and Chief Executive Officer Lou Gerstner said the company spent 20% of its $6.1 billion research and development budget on network computing products.

Still, the task IBM's new and improved products face is daunting, especially as the vendor meets strong competition from Cisco Systems, Inc. and others that already have a strong presence at the edge of the network. Another problem is that Cisco, with its channel-attached router and its own SNA migration philosophy, is beginning to give IBM trouble at the heart of very large enterprise networks that in the past have been "true Blue."

While the battle for the corporate backbone is not new, it is obviously heating up again, IBM hopes this time with a Blue-tinted flame.

"I know that it'll be IBM, not Cisco, leading SNA users to the Internet world," said Lutz Hahne, general manager of IBM's Networking Hardware Division. "We now have the network infrastructure products that can take users any direction they want to go."

For some users, IBM's message is beginning to have an impact.

"It appears to us that, as of late, IBM is taking the gloves off and isn't being punched around by 3Com and Cisco on features and pricing like is has in the past," said Philip Freyer, manager of domestic networking architecture and design for United Parcel Service of America, Inc. UPS will have some 1,200 IBM 2210 routers by the end of the month. "IBM isn't the first company most people think of for networking or internetworking gear, but those who have passed them over in the past may want to take a second look," Freyer said.

Analysts agreed that a second look should be coming IBM's way. "IBM is in a period of refreshing their existing products while rolling out the new products it will use to move into the future," said Frank Dzubeck, president of the Communications Network Architects, Inc. consultancy in Washington, D.C. "IBM is telling users it can migrate them from SNA, but also that it has a strong LAN [connectivity] story to tell," he said.

Cisco has just steamrolled IBM in the areas IBM needs to be successful, added Paul Wickre, president of Frame Relay Systems & Technology, Inc., a consultancy in Chevy Chase, Md. "IBM had a lot of missing pieces until this announcement, and it now has a competitive, broad line of access, TCP/IP and multiprotocol offerings to give Cisco some serious competition."

As expected, the new products included the 8273 and 8274 LAN switches that offer Ethernet-to-ATM and other switched services (*NW,* Sept. 30, page 1). Ten new modules for the 8260 Nways Multiprotocol Intelligent Switching Hub debuted, supporting various networking technologies including a backplane extension for ATM switching at 2G bit/sec. A group of Nways network management tools now supports virtual LAN management using the ATM Forum's LAN Emulation standard.

IBM enhanced a number of existing products, as well. For example, IBM improved the 3746 Nways front-end processor with supports for the Rapid Transport Protocol component of its High Performance Routing technology, giving the box full HPR support. ■

IBM PRODUCT BLOWOUT

New. . .

Product	Description	Availability
2216 Nways Multi-access Connector	Feeder device	March 1997
8273/8274 Nways switches	Xylan's LAN switches	Now
9729 Wave Division multiplexer	Fiber-based channel connectivity box	Now
2210 router	New models, HPR support	January 1997
Nways Network Manager	Management applications	Phased rollout this year through 1997
8235 Model I-40	Remote dial-in LAN access device	November
8270 switch	Token Ring LAN switch	March 1997
8300 Video Node	Video access device for ATM nets	March 1997

. . .and improved

Product	New features	Availability
3746 Nways 900/950 front-end processors	Support for HPR, Fast Ethernet	Between December 1996 and June 1997
2220 Nways ATM switch	Increased port density, T-3 cards	Not available
2217 Concentrator branch office device	Increased port density, gateway enhancements	January 1997
8260 hub	High-speed backplane modules	December

Microsoft pledges fix for its distributed object technology

By John Cox

Microsoft Corp. plans to fix a big shortcoming in its distributed object model this November when it announces technology that will let software components find each other across a network.

The technology — in effect, a naming service or directory — to be added to Microsoft's Distributed Component Object Model (DCOM) is essential for creating networked applications pieced together from many widespread components. Today, application developers have to enter the name and location of all DCOM components in a database called the OLE Registry, which runs on every Windows NT 4.0 computer that supports the application.

Not ready for prime time

Without the new technology, developers may hold back from DCOM and turn to alternatives.

"We think Microsoft's Active-X is going to be very successful in the market," said Bob Bickel, director of software products at Bluestone, Inc., a Mount Laurel, N.J., vendor of Web development tools. "But DCOM has some maturing to do before it becomes production-quality middleware. And we see other middleware [options] emerging that get around DCOM."

"We have technology in beta now that automates this [registry] process," said James Utzscheider, Microsoft's group product manager for server development tools. "Our vision and direction will be crystal clear for folks when we announce it at [Microsoft's] Professional Developers Conference."

> *Application developers confirm that DCOM delivers good performance and is easy to use.*

Application developers doing early work with DCOM confirm that it does indeed work, is easy to use and apparently delivers good performance.

DCOM's constituent elements are delivered today as part of Windows NT 4.0. The Windows 95 version is now in beta. In effect, Microsoft has grafted onto what most developers still know as OLE, what is needed for components to call each other over the network.

But the OLE Registry remains largely unchanged: It has to be configured almost entirely by hand on each computer in a network.

"What's not covered in DCOM is the automatic distribution of the [registry] information," said Mark Creamer, director of development planning at Software AG in Reston, Va., which is porting DCOM to other operating systems. "Manual propogation doesn't scale [in a network]. Everyone knows it. And there will be a solution for it."

The solution currently consists of firm promises and vague descriptions from Microsoft. The company is readying tools to automate much of the work of configuring the registry. But that will solve only part of the problem.

What is still missing, analysts and developers say, is a clear description of just how Microsoft will help all these ActiveX controls it envisions on the network to find each other.

Microsoft currently has NT Directory Service (NT DS) and is preparing a OLE-DS, which will be a distributed directory with COM interfaces to let it work with other directory services.

Microsoft plans to create a COM repository, which will store information about COM objects on the network and integrate this with OLE-DS, according to Nat Brown, group program manager for OLE. The repository information will be accessed via the COM interfaces, according to Brown.

"Right now, those are all just separate pieces," said David Smith, research director for the Internet at Gartner Group, Inc. in Stamford, Conn. "The directory [in the future Cairo version of Windows NT] is what holds it together. Microsoft just hasn't delivered on this." ■

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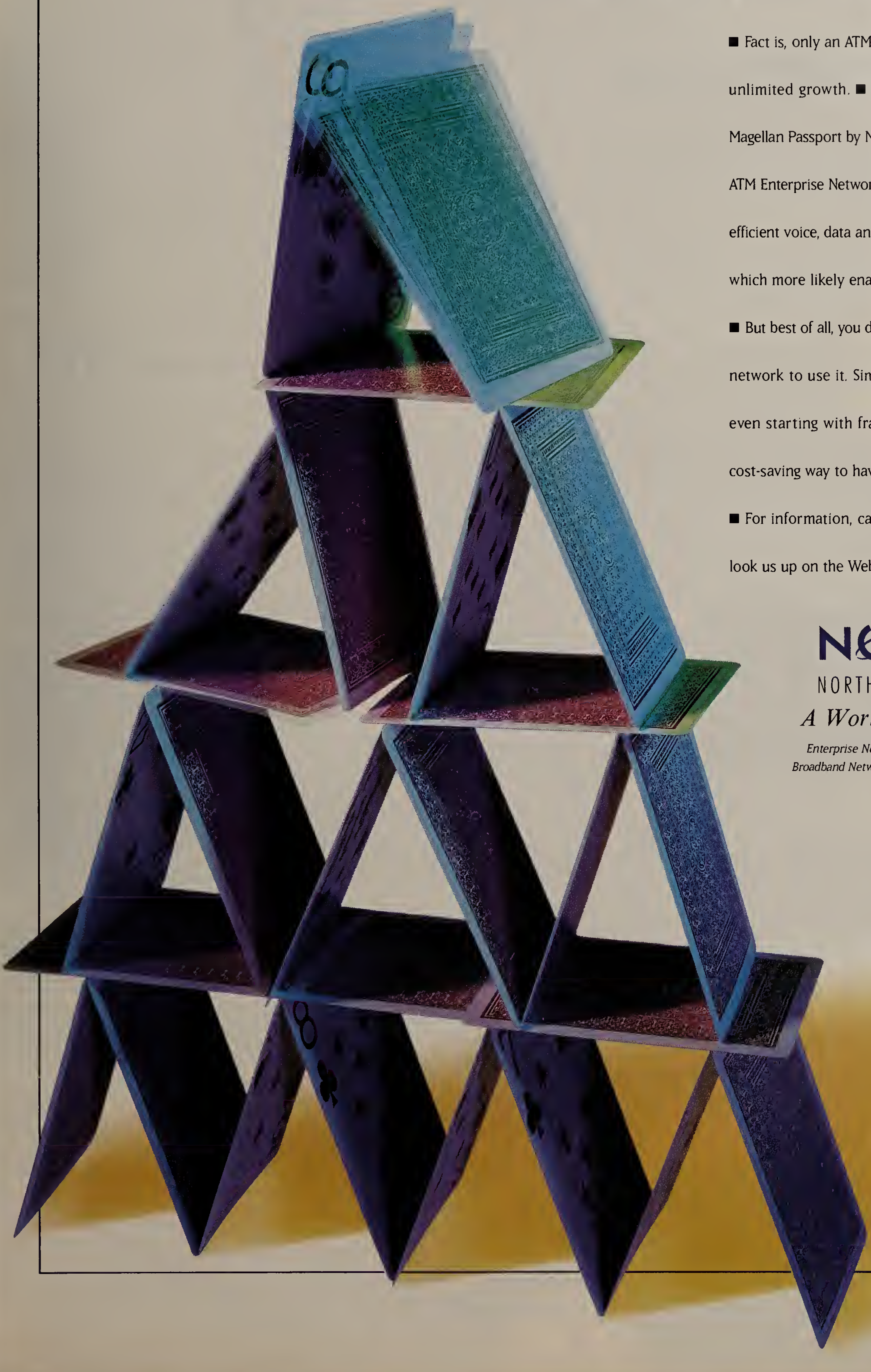

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ATM is spanning the globe

By Joanie Wexler
Washington, D.C.

The handful of U.S. companies using ATM network services will soon have the option of extending their networks internationally — at least if they are MCI Communications Corp. customers.

The carrier last week said it has already installed and tested switches in the U.K. that will link its HyperStream ATM network in the U.S. with the CellStream ATM network of its Concert joint venture partner, British Telecommunications plc.

The carriers intend to have commercial services between the U.S. and the U.K. available at the end of the year, running at 45M and 155M bit/sec and offering constant bit rate and variable bit rate classes of services. The new services will be available from MCI or BT.

AT&T Unisource Services, meanwhile, had hoped to be first to make ATM global, but its effort will not bear fruit until the middle of next year.

In addition, MCI intends to add T-1 ATM services to its own domestic offering, said Claire Lewis, MCI senior manager of broadband cell services.

To date, the only other carrier offering a trans-Atlantic ATM link is MFS Datanet, a fast-packet subsidiary of MFS Communications Company, Inc. However, since last month, AT&T has been testing trans-Pacific ATM services with Kokusai Denshin Denwa Company, Ltd., the Japanese member of WorldPartners.

MCI and BT target ATM offerings

Q4 1996
Will roll out U.S.-to-U.K. 45M and 155M bit/sec ATM service; variable bit rate and constant bit rate service from either carrier; domestic T-1-speed ATM service from MCI.

Q4 1997
Will provide the above services – via their Concert joint venture – in 13 countries within North America, Europe and Asia.

Q4 1998
Will offer managed ATM services throughout connected countries from Concert.

The lack of international ATM services probably has not left many users wanting: Only about 100 U.S. organizations are using ATM services at all, according to TeleChoice, Inc., a consulting firm in Verona, N.J. And many of those are government agencies, such as the National Science Foundation.

Historically, there has been much talk of ATM's potential in efficiently aggregating voice, data, video and image traffic onto one corporate backbone. But today, the few organizations using it "are simply looking for a less expensive DS-3" circuit, mostly for carrying data, said Beth Gage, broadband consultant at TeleChoice.

Because ATM is scalable, users can cordon off, for example, 20M bit/sec of the service when they specify their committed information rate, if that is what matches their traffic needs, rather than springing for a full 45M bit/sec dedicated line.

MCI's Von Rump *says customers have been asking for global links.*

But Stephen Von Rump, MCI vice president of enterprise marketing, said the company has several customers in the chemicals, manufacturing, imaging, high-technology and oil industries that have been using its domestic service and asking for global links.

Amoco Corp. telecom analyst David Beering said he has been testing some ATM services to bring high-quality health care to remote areas. "You can't replicate the expertise of specialists in every remote place. So being able to transfer [CAT and MRI] scans to specialists over ATM could be a benefit." ■

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Carriers drive ATM home over ADSL

By Tim Greene

With next year's rollout of broadband services over traditional copper local loops will come an added attraction: ATM to the home.

A consortium of four regional Bell operating companies last week chose Alcatel Data Networks, Inc. to supply gear that will enable the carriers to deliver ATM cells over high-speed Asymmetric Digital Subscriber Lines (ADSL). Ameritech Corp., BellSouth Corp., Pacific Bell and SBC Communications, Inc. will use the Alcatel gear to offer customers multiple high-speed ATM virtual circuits over individual phone lines.

Ethernet interface to connect with LANs, as well.

The RBOCs plan to negotiate with Alcatel for the devices in a deal that observers said could be worth $300 million. Alcatel said it beat the RBOCs' target price of $500 per line.

SBC will not start testing the Alcatel ADSL devices until after the first of the year, but that is not a concern. "They are being built to our specifications," said Ed Reisner, regional manager for technology and product development at SBC.

Both devices in the Alcatel 1000ATM system include an ADSL modem that can adjust the actual ADSL bandwidth that a given line supports, allowing the carrier to adapt for length of the local loop, condition of the copper wire and the power available to transmit the signal.

ADSL ON TRACK

These four regional Bell operating companies have settled on Alcatel gear to support Asymmetric Digital Subscriber Line services.

Carrier	Ameritech	BellSouth	Pacific Bell	SBC
Trials	Starting Internet access trial in Illinois	Ongoing in Atlanta with BellSouth employees	Ongoing in San Ramon, Calif.	Internet access, work at home and video-conferencing with Shell Oil in Houston
Commercial plans	Commercial service in mid-1997	Market trial in early 1997	Internet access service in first half of 1997	Commercial service in mid-1997

Alcatel 1000ADSL would deliver ATM over ADSL at speeds up to 5M bit/sec, which is slower than some other ADSL technology but fast enough for the applications the RBOCs have in mind.

Provisioning ATM to the home costs more than alternatives, such as Ethernet, but ATM fits in with carriers' plans to push ATM toward the edge of their networks.

ATM traffic coming into telephone company central offices removes the need for large, cell conversion devices. Traffic can be dumped directly onto ATM switches that can establish virtual circuits to a variety of services.

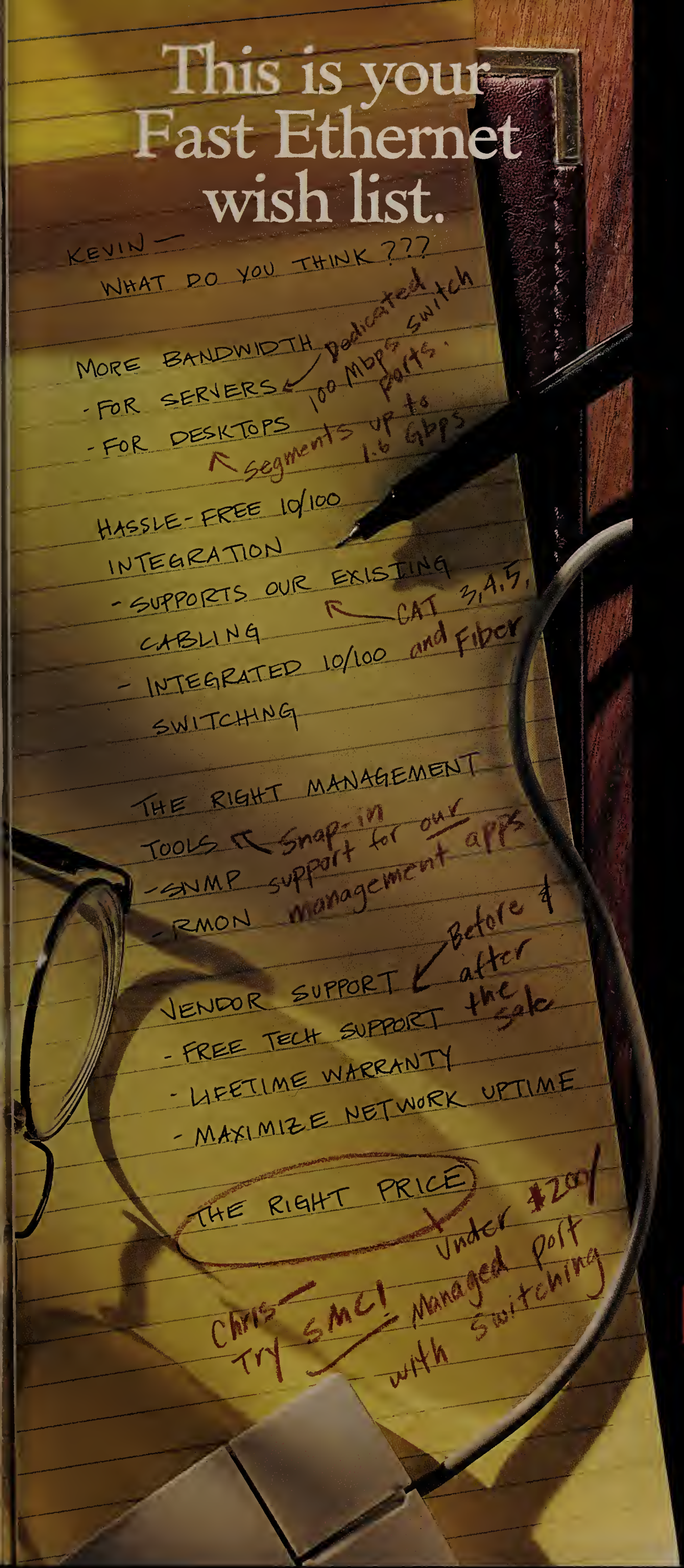
The Alcatel 1000ADSL architecture consists of an ADSL network terminator (ANT) at the user's site and an access adapter in the carrier network. The ANT will come with an ATM network interface card for PCs and later with a 10M bit/sec

Meanwhile, the search goes on for bottlenecks that persist between Web servers and Web browser clients, which have ADSL developers worried (*NW*, Oct. 7, page 1).

A recent FB Laboratories, Inc. test did not isolate the bottleneck but demonstrated that one existed between the server disk and the client screen, and that the delay was not caused by the wide-area transport link.

The Internet Engineering Task Force addresses one possible contributor to the problem in its next version of HTTP. HTTP 1.1 will reduce the number of TCP/IP sessions that a Web browser must open to pull down a single Web page. ■

This is your Fast Ethernet wish list.



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ACQUISITION FRENZY

3Com plans ATM splash with OnStream deal

By Tim Greene

Santa Clara, Calif.

Ripping a page from the Cisco Systems, Inc. playbook, 3Com Corp. last week snapped up a seasoned veteran in wide-area ATM and hopes to use its new purchase as an entree to carriers and Internet service providers.

The $245 million purchase of ATM multiplex maker OnStream Networks, Inc. strategically broadens 3Com's line. It was calculated to give 3Com ammunition to challenge Cisco for the rapidly growing ATM access market among phone companies and ISPs.

Scheduled to be closed by the end of next month, the deal will give 3Com a product line that ranges from PC adapter cards to ATM access boxes.

They will likely include modular versions of OnStream devices to fit into 3Com gear such as the CELLplex 7000 Ethernet/ATM switch.

They will also include stackable versions of OnStream gear to fit the shape of 3Com's SuperStack II Switch 2700 stackable workgroup switches, 3Com said.

And 3Com will likely add routing and bridging capacity to OnStream products, which now simply concentrate traffic, according to Thomas Nolle, president of CIMI Corp., a technology assessment firm in Voorhees, N.J.

Claude King, senior systems programmer for the University of Florida at Gainsville, a 3Com shop, said he was nervous that 3Com's 1995 purchase of Chipcom Corp. would degrade 3Com support. But, that support has improved.

3Com is a member of the Gigabit Ethernet Alliance and claims to support that technology as well as ATM without bias. But the OnStream deal indicates 3Com believes in ATM as a wide-area transport.

"3Com is saying, 'We're not comfortable confronting an ATM-centric competitor [Cisco] with a Gigabit Ethernet

See 3Com, *page 14*

3Com/OnStream at a glance

	OnStream	3Com
Based	Santa Clara, Calif.	Santa Clara
Founded	1989 (as T-3plus)	1979
1996 revenue	$10 million to $15 million (estimated)	$177.9 million
Products	ATM and SONET access and inverse multiplexers, including the Cellstream, BMXstream, LXstream and CLstream families	LAN switches, hubs, routers, Ethernet adapters, terminal servers, ISDN adapters and PC Card adapters
Employees	96	5,190

CA snaps up Cheyenne for $1.2 billion

By Jim Duffy

Islandia, N.Y.

Computer Associates International, Inc. last week said it will acquire Cheyenne Software, Inc. through a cash tender offer of about $1.2 billion.

The deal gives CA a data storage management product for desktops and LAN workgroups, something the company has been unable to offer to date. Cheyenne's ARCserve is one of the leading storage management products for Microsoft Corp. Windows NT and Novell, Inc. NetWare environments.

"They want to get onto the desktop and have more influence there, and get there through the indirect channel," said Brandon Musler, an analyst at Illuminata, Inc. in Nashua, N.H.

Musler said CA can also leverage Cheyenne's indirect channels to flood the market with its agent technology.

"This will definitely come in and fill some gaps," said CA user and reseller Chris LoPresti, CA-Unicenter area sales manager at Access Graphics in Boulder, Colo. "If nothing else, CA's very good at knowing where they're a little weaker, and either going out and purchasing or partnering with somebody."

Interestingly, Access Graphics uses a storage management product from Cheyenne competitor Legato Systems, Inc. with CA-Unicenter. The only benefit Access Graphics could gain from the CA/Cheyenne union would be if the company dumped Legato's NetWorker in favor of ARCserve, LoPresti said.

From CA's standpoint, the Cheyenne purchase is highly complementary and presents little if any product or marketing overlap, said CA Chairman and Chief Executive Officer Charles Wang. It is so complementary that CA does not plan to lay off any of Cheyenne's 800-plus employees, Wang said.

From CA's standpoint, *the Cheyenne purchase is highly complementary and presents little, if any, product or marketing overlap, said CA's Wang.*

As for marketing, 90% of CA's sales are direct, while 90% of Cheyenne's sales are through indirect channels, Wang said.

Cheyenne was courted earlier this year by rival McAfee, which offered $1 billion, or $27.50 per share, for the company. But that overture degenerated into a name-calling spat between McAfee CEO Bill Larson and Cheyenne CEO ReiJane Huai, and the deal was subsequently scrapped (*NW,* April 22, page 10).

CA expects to complete the deal in about a month. ■

Software sweethearts

	Cheyenne	Computer Associates
Based:	Roslyn Heights, N.Y.	Islandia, N.Y.
Founded:	1983	1976
Products:	Storage management, security and communications products, including Cheyenne HSM, JETserve, InocuLAN, FAXserve and its flagship product line, ARCserve	More than 500, including system management software, application development tools, manufacturing and financial applications
1996 revenues:	$174 million	$3.5 billion
Employees:	800	More than 9,000

AT&T spin-off Lucent buys Agile to flesh out multimedia vision

By Jim Duffy

Murray Hill, N.J.

Lucent Technologies, Inc. last week made its first acquisition since being spun off from AT&T and brought its multimedia networking vision into clearer focus with the buyout of ATM switch vendor Agile Networks, Inc. for an undisclosed sum.

Agile's closet and backbone switches, and LAN emulation and virtual LAN management software give Lucent key technologies to support the integrated voice, data and video applications of the future. Indeed, the Agile deal complements a multimedia initiative Lucent launched with Bay Networks, Inc. last summer.

Under the Bay deal, the two firms agreed to cross-license technology while independently developing and marketing multimedia products (*NW,* July 22, page 8). Lucent acquired routing and network management source code from Bay, and resells Bay hubs, routers and switches.

Lucent will continue to resell Bay gear even after completing the Agile acquisition, said Carl Pavarini, Lucent's vice president of multimedia systems. Bay and Lucent are jointly planning architectures and interfaces for next-generation multimedia networks, he said. But some Bay-Lucent shops want airtight assurances that Lucent will not forget them. "I hope they would not, but long term, I believe they're looking to develop their own product line with Agile as the foundation," said Debra Chrapaty, director and group manager of information technology at the National Basketball Association in Secaucus, N.J. "I need to make sure their long-term commitment is also with Bay Networks because it's certainly the NBA's long-term commitment."

Analysts predicted Lucent's acquisition of Agile will not alter the Bay arrangement. But they said Lucent will have to tweak Agile's switches if it wants to offer a competitive multimedia product line.

"The thing they need to do with the Agile technology now is work on the performance," said Nick Lippis, president of Strategic Networks Consulting, Inc. in Rockland, Mass.

Through the deal, Lucent gets Agile's 17-port ATMizer 125 ATM and Ethernet Switch, the 12-port ATMizer 121 Ethernet switch, ATMizer LAN Emulation (LANE) Server and ATMman Virtual LAN Policy Manager. Lucent will augment the Agile gear with routing and network management code sourced from Bay, Pavarini said.

Lucent will also foster interoperability between Agile's VLAN technology and Bay's technology through the Agile LANE Server, said Bill Seifert, chief executive officer of Agile.

Seifert will continue in that post as Agile becomes part of Lucent's Business Communications Systems unit. ■

COMING TOGETHER ON SWITCHING

Lucent Technologies
Based: Murray Hill, N.J.
Founded: 1996
Products: Telephone switches and software, ISDN CPE, phones
1996 revenue: $24 billion
Employees: 125,000

Agile Networks
Based: Boxborough, Mass.
Founded: 1991
Product: ATMizer Ethernet-to-ATM switch
1996 revenue: Not available (privately held)
Employees: 60

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Cisco, Bay target power users

By Jim Duffy

Cisco Systems, Inc. and Bay Networks, Inc. last week unveiled hubs and switches designed to quench users' thirsts for higher performance networks.

Cisco introduced stackable Fast Ethernet hubs for small networks, and Bay unveiled an Ethernet switch for microsegmenting LANs and delivering more bandwidth to individual users.

"Bay needed to get some low-end products out," said Esmeralda Silva, a senior analyst at International Data Corp. in Framingham, Mass. "That's obviously where the market's going in terms of volume."

Cisco's FastHub 300 series *of manageable, stackable Fast Ethernet Hubs were introduced last week.*

Cisco's FastHub 300 hubs come standard with 15 100Base-TX ports and one 100Base-TX or 100Base-FX uplink. Expansion slots on the FastHub 300 chassis let users add another 16 ports and a network management module, or a total of 32 managed ports in a single 100M bit/sec hub.

Up to four FastHub 300s can be stacked into one logical 100M bit/sec repeater sporting 128 ports. Also, two stacks can be linked to form a 254-port collision domain, Cisco said.

A single network management module can monitor an entire stack. Management options include in-band SNMP; in-band or out-of-band menu-based console access; Remote Monitoring statistic collection on a per-port, per-unit and per-stack basis; and mode-selectable LEDs.

The FastHub 300 is designed to offer configuration flexibility for workgroups requiring a range of densities, and for creating server farms accessible over shared 100M bit/sec uplinks from those workgroups. "You're talking under $200 for a 100-T shared port vs. above $500 for a switched 100 port."

"It's basically for people who need to crank up their network and are not going to get it through segmentation," said IDC's Silva.

Prices for the FastHub 300 range from $125 to $150 per unmanaged port to $140 to $240 per managed port. The line will be available later this month.

Bay eyes the desktop

Bay's new BayStack 301 desktop Ethernet switch gives high-performance workgroups access to switched 100M bit/sec backbones. It features 22 switched 10Base-T ports and two 100Base-TX uplinks at $199 per port.

The BayStack 301 supports 10,240 media access control addresses and can be managed through Bay's Optivity management application suite.

In workgroup applications, the switch can be used to provide high-performance server access to individual desktops and to switch between shared-media segments. In the wiring closet, the 301 can link these workgroups to a switched 100M bit/sec backbone anchored by Bay's 28115 Fast Ethernet switch.

The BayStack 301 is available now.

Bay also rolled out shared-media Fast Ethernet modules for its System 5000 targeted at high-density wiring closets and network centers. They work with a new three-segment 100Base-T backplane for the System 5000 and will be available in December. Bay did not disclose pricing for the System 5000 modules.

©Cisco: (408) 526-4000; Bay (508) 670-8888.

Cisco's and Bay's new releases

Cisco

FastHub 300

- 15 100Base-TX ports and one 100Base-TX or 100Base-FX uplink; expansion slots for another 16 ports; and a network management module
- Can be stacked in groups of as many as four hubs
- Stacks can be monitored via a single management module

Bay

BayStack 301 desktop Ethernet switch

- 22 switched 10Base-T ports and two 100Base-TX uplinks
- Advanced traffic control through support for 24 individual port-based VLANs or bridge groups

Fast Ethernet System 5000

- UTP and fiber host modules
- Integrated Fast Ethernet connectivity, switching and routing in a single chassis

Full Moon rising over Microsoft's Wolfpack

Software to be integrated with Solaris operating system.

By John Robinson
Mountain View, Calif.

SunSoft, Inc. is looking to take the bite out of Microsoft Corp.'s Wolfpack Windows NT clustering software with clustering tools for Solaris.

The new offering, code-named Full Moon, will let companies group an unlimited number of servers in a configuration that can be managed as one system.

While the company refused to give product details, SunSoft executives said the software should be available early next year for scalable processor architecture (SPARC) and Intel-based systems.

Wolfpack, also expected early next year, will let NT servers back each other up in case of failure. It is expected to support clusters of just two servers in its initial release.

Sanjay Sinha, marketing manager for Solaris, said Full Moon's centralized management capabilities will allow administrators, for example, to reboot all computers and drives from one console.

"This makes the cost of management the same as if you were managing one computer," Sinha said. "With Full Moon, you can install software once [on the cluster] and not have to reinstall it [on each system]."

Brad Day, senior analyst with Giga Information Group in Boston, said it sounds as if the software will take Sun Microsystems, Inc. from having a fair clustering technology to a good one — but not the best.

"While Sun will position this technology vis-a-vis Wolfpack, among Unix clustering solutions this technology is not breakthrough at all," Day said. "And people are not going to be buying Solaris over NT because it has a better clustering solution. They are going to be buying Solaris because it is a better operating system for the Intel platform."

Earlier this month, Sun announced two clustering systems — a high-availability system and a parallel database cluster — for the Ultra Enterprise server line. ■

> *According to Day, people are going to buy Solaris because it is a better operating system for the Intel platform.*

3Com

Continued from page 12

product set.' This may create a crack in the Gigabit Ethernet ranks, or it may be a demonstration of one," Nolle said.

The Cisco model

The OnStream deal echoes Cisco's purchase of StrataCom, Inc. (*NW*, April 29, page 7) but on a less grand scale. Cisco now has gear that ranges from LAN hubs to core carrier switches, and it boasts dominance among ISPs with routers that anchor the Internet.

"Cisco pretty much owns the carrier market at this point," conceded Andrew May, vice president of 3Com's network services division.

But May said he hoped the addition of OnStream's CLstream and CS600 ATM access devices would give 3Com an edge.

"I don't believe Cisco has a product in this space. I'm going to bring something to the carrier before Cisco can," May said. ■

Lotus hooks Organizer to the Web

By Barb Cole
Cambridge, Mass.

Lotus Development Corp. this week will unveil software for accessing calendars and schedules tracked in its Organizer 97 personal information manager over the Internet.

The application, dubbed Organizer 97 Web Calendar, runs on a Web server where users can post Organizer files that may be shared by other users via Web browsers.

The Common Gateway Interface application serves up information stored in the Organizer file as a standard Web page.

While the software will support the sharing of schedules over the 'Net, it will not support advanced features such as searching for free time across different calendars, according to Lotus officials.

More advanced Internet calendaring capabilities are on tap, however. Lotus is pushing its Internet Calendar Access Protocol (ICAP) specification, which would allow disparate client and server applications to exchange calendaring and scheduling information over the Internet.

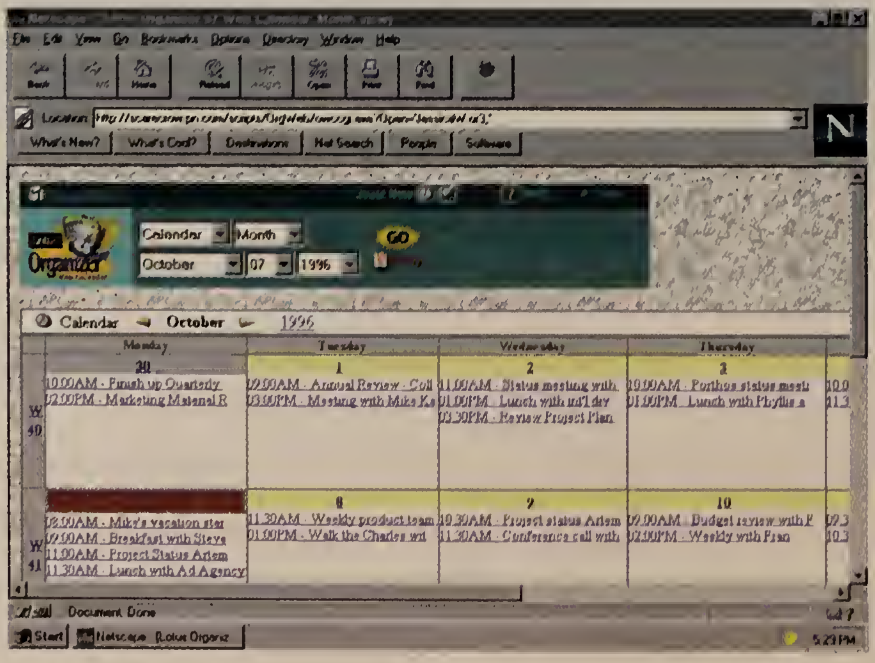
That specification, along with work from several other vendors, is being considered by the Internet Engineering Task Force, the protocol engineering and development arm of the Internet. ICAP is expected to eventually be incorporated into Organizer as well as Notes.

Analysts applauded the move.

"[Organizer 97 Web Calendar] will result in global access to calendaring information," said Judy Rosall, president and principal analyst at Worldscape Strategies in Half Moon Bay, Calif.

The software will be available next month as a free download from Lotus' Web site.

©Lotus: (800) 343-5414.



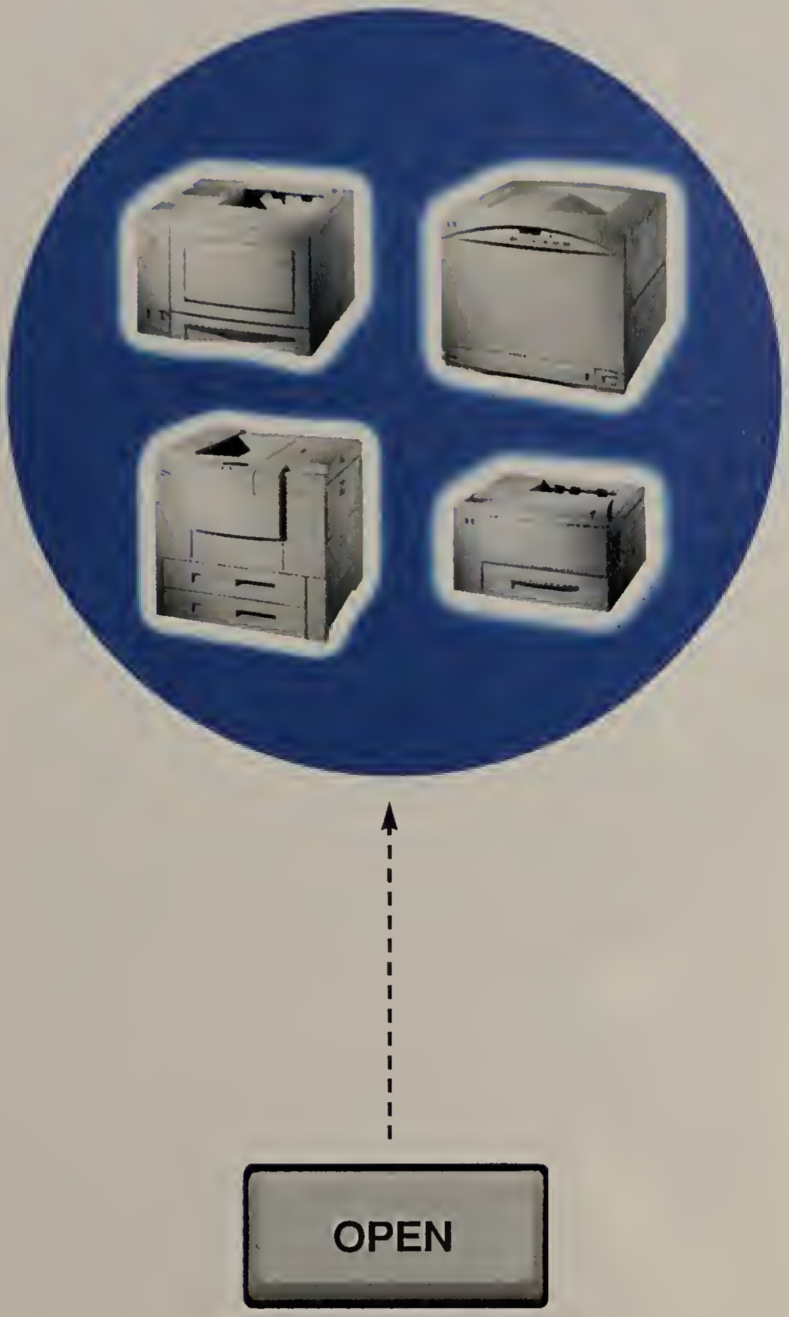
Calendar: Month

October 07 1996

Calendar October 1996

	Monday	Tuesday	Wednesday	Thursday
W 40	30 10:00AM - Finish up Quarterly 12:00PM - Marketing Material R	1 09:00AM - Annual Review - Coll 03:00PM - Meeting with Mike Ka	2 11:00AM - Status meeting with 01:00PM - Lunch with int'l dev 03:30PM - Review Project Plan	3 10:00AM - Porthos status meeti 01:00PM - Lunch with Phyllis a
W 41	08:00AM - Mike's vacation star 09:00AM - Breakfast with Steve 11:00AM - Project Status Artem 11:30AM - Lunch with Ad Agency	8 11:30AM - Weekly product team 01:00PM - Walk the Charles wit	9 10:30AM - Project status Artem 11:30AM - Conference call with	10 09:00AM - Budget review with F 02:00PM - Weekly with Fran

Using Web Calendar, *users can access and share Organizer 97 schedules via the Web.*



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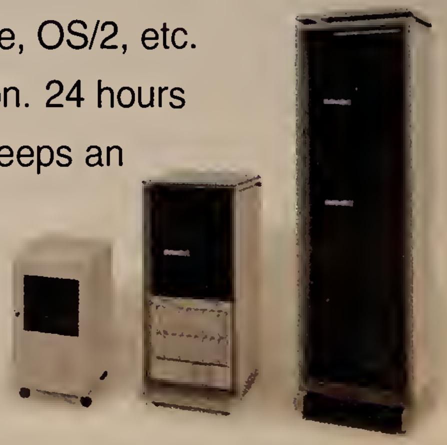


WANs & Internetworking

Covering: Network Architectures and Management • Routers • Muxes, Remote Access Gear, Modems, PBXs and other CPE • Mobile Computing Products

Briefs

■ **SNMP Research International, Inc.** *has unveiled World-Wide Web-based* **net management** *products: DR-Web Manager, a Web browser interface for SNMP management stations; DR-Web Mid-Level Manager, a Java-based agent for proactive management from a Web browser; and DR-Web Extensible Agent, a version of the company's Emanate product that supports HTTP as well as SNMP. DR-Web costs $1,995 for the initial copy and $45 per copy thereafter. The line will be available by year-end.*

SNMP Research: (423) 579-3311.

■ **Micom Communications Corp.** *announced a* **price cut** *to its Marathon family of multiplexers and NetRunner routers. Cuts range from 20% to 40%.*

Micom: (805) 583-8600.

■ **Oracle Corp.,** *based in Redwood Shores, Calif., last week launched a new version of its Oracle Mobile Agents middleware, which allows users to run their applications over* **wireless networks.** *The new version, to ship within 30 days for $199 per user, adds support for Motorola, Inc. DataTac packet radio networks — run by ARDIS Co. in the U.S. — and Windows NT as a client. The software also adds several security enhancements, such as message encryption and stronger user authentication schemes.*

■ **Eicon Technology Corp.** *last week announced it will introduce an* **ISDN terminal adapter** *for PCs with 32-bit PCI buses. It will be available in November, and pricing will be announced at the time of shipment.*

Eicon: (214) 239-3270.

■ **Ascend Communications, Inc.** *last week announced NetWarp* **ISDN** *ISA-bus adapter cards for PCs. Shipping Oct. 30, the units cost $229.*

Ascend: (800) 621-9578.

NetEdge adds voice to ATM traffic mix

By Tim Greene

Research Triangle Park, N.C.

NetEdge Systems, Inc. this week is rolling out a new product line that gives large users a way to selectively route legacy LAN as well as PBX traffic onto ATM backbones.

The four Edge devices will fit in private ATM networks in fields such as health care and finance, where users want to connect some LANs but segregate others for accounting and security, the company said.

MAKING THE LAN CONNECTION

NetEdge introduces three ATM service access routers this week. The base unit of each includes Ethernet ports and an ATM interface.

	Chassis	Interfaces	Price
Edge 85	Four slots	Ethernet, Fast Ethernet, token ring, FDDI, T-1 circuit emulation, ATM (DS-3, OC-3)	Starts at $28,000
Edge 65S (single user)	One slot	T-1 circuit emulation, one ATM port	Starts at $21,000
Edge 65M (multiple users)	*Same as Edge 65S, but routing software supports as many as four separate user groupings*		
Edge 40S	Integrated box	Four Ethernet ports, one ATM port	Starts at $17,000

The Edge gear incorporates virtual routers, setting it apart from ATM devices by Sahara Networks, Inc. and OnStream Networks, Inc. that simply concentrate various types of legacy traffic on to an ATM trunk for switching, according to Frank Dzubeck, president of Communications Network Architects, Inc., a consultancy based in Washington, D.C.

The largest of the new offerings, the Edge 85, offers more ports per unit than NetEdge's current Edge Connect offering. It also doubles the Ethernet-to-ATM conversion rate with more processing power.

In addition, the new products introduce 100M bit/sec Ethernet and T-1 circuit emulation interfaces to handle voice traffic.

Interest from carriers

Carriers can use the Edge products to provision LAN connection services. BC Tel Advanced Communications, a subsidiary of BC Telecom, Inc. in British Columbia, will use Edge devices to provision new voice/data services. The gear is less expensive than alternatives, allowing lower provisioning costs and service rates, according to Eleanor Jang, engineering manager for the carrier.

All of the devices can take in Ethernet or Fast Ethernet and drop it onto either a 45M or 155M bit/sec ATM trunk. They can ration out the ATM bandwidth at increments as small as a single kilobit. Edge 85 includes a base unit of eight Ethernet ports — six for 10M bit/sec and two that can be either 10M or 100M bit/sec Ethernet. It also includes a 45M bit/sec or OC-3 ATM port at 155M bit/sec.

Four user slots can be fitted with any mix of four-port token-ring cards, a single-port FDDI card, an eight-port T-1 circuit emulation card or an Ethernet card that mirrors the Ethernet capacity of the base unit. One slot can be used for redundant ATM trunking.

The Edge 65M and Edge 65S have only four Ethernet ports in the base device and a single slot for a circuit emulation card. The 65M supports routing for as many as four separate users; the 65S supports it for just one user.

The Edge 40S has only the base configuration of the Edge 65 releases.

ⒸNetEdge: (919) 991-9000.

Interlink TCP/IP thinks big

By Michael Cooney

Fremont, Calif.

Interlink Computer Sciences, Inc. is looking for a few big mainframe TCP/IP users.

Interlink's *Markle says the company's new software targets large TCP/IP users.*

The company last week outlined an aggressive push into large IBM TCP/IP-based mainframe accounts with new versions of its TCPaccess family. The new software promises increase IP performance throughput on the big iron tenfold and reduce CPU utilization by 25%.

"With some 3.5 million desk-

See **Interlink,** ***page 18***

Defense to move nonclassified traffic to ATM

By David Rohde

Washington, D.C.

The Department of Defense has decided that ATM is not just for broadband applications anymore.

In another sign of ATM's emerging installed base, the Defense Information Systems Agency (DISA) recently tuned up a Sprint Corp. ATM WAN to transport day-to-day traffic such as payroll and accounts receivable.

As of early this month — the beginning of the government's fiscal year — Sprint's ATM service became the new backbone for the Defense Department's Non-secure IP Router Network (NIPRNET).

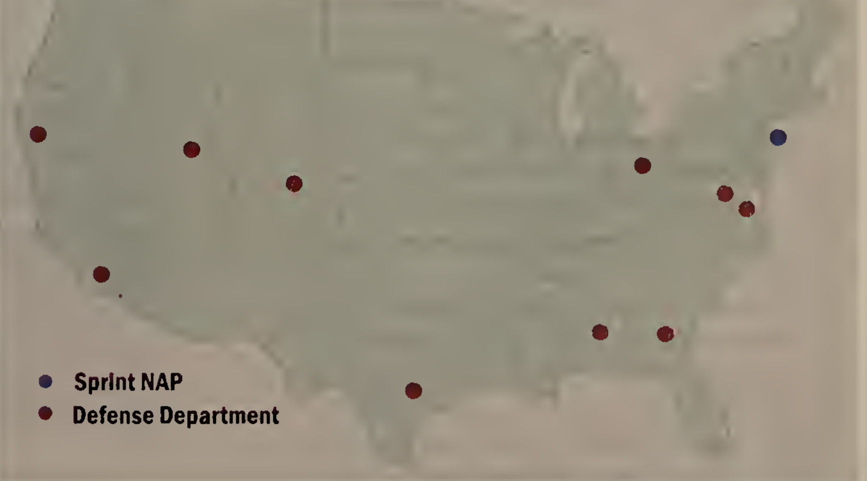
Defense officials said only ATM would satisfy the department's gargantuan appetite for WAN capacity, a requirement for even the most prosaic applications. They chose Sprint's service over MCI Communications Corp.'s HyperStream ATM service, citing Sprint's method of deploying Synchronous Optical Network (SONET) transmission routes at speeds they hope will reach OC-12, or 622M bit/sec.

Initially, the ATM net will connect 10 major NIPRNET nodes at speeds of DS-3, or 45M bit/sec. But even that is much faster than the NIPRNET backbone it replaces — dedicated T-1 circuits under AT&T's Defense Commercial Telecommunications Network.

See **Defense,** ***page 19***

ATM ALL THE WAY

Under the fully meshed Non-secure IP Router Network, Sprint provides a DS-3 ATM virtual path among 10 Defense Department sites, which each also link to Sprint's network access point (NAP) for Internet traffic.



Interlink

Continued from page 17

tops accessing IP resources on the mainframe in the next couple of years, TCP/IP performance on the mainframe is going to become a critical issue," said Chris Markle, chief technology officer with Interlink.

The company in the next 10 months will roll out two new releases of its flagship TCPaccess MVS mainframe-based TCP/IP software that will improve the performance of IP net traffic flowing to the mainframe. The software will also add a variety of new features such as support for IBM's OpenEdition and other new items the company hopes will give it a leg up on IBM's TCP/IP for MVS product. OpenEdition is IBM's Portable Operating System Interface-compliant software that makes the mainframe a big Unix server.

Read up on IBM's efforts to bring TCP/IP to mainframes.

Enter the number to the right in the DocFinder box on the home page.

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Network World Fusion

The first new release, TCPaccess 4.1, will be available in January and — compared to the current 3.1 version of TCPaccess — claims to provide a 25% decrease in mainframe CPU utilization when handling TCP/IP traffic. It also adds support for OpenEdition Unix applications. IBM has been pushing hard to get Unix developers to port their applications to the mainframe in its continuing effort to make the big box more of a server.

While performance is better, Release 4.1 also contains a new Interlink API that will let existing SNA applications communicate over an TCP/IP backbone without requiring modification or a remote gateway. This release will also treat IBM's 3745/3746 front-end processors as TCP/IP devices. IBM added native IP routing support to the box this year.

Later in 1997, Interlink will build upon the 4.1 release to come out with TCPaccess 2001, the next generation of TCPaccess. That version promises to improve high-speed TCP/IP access to the mainframe by 10 times more than today's release. It will also support as many as 25,000 tn3270 users, up from 5,000 in its existing 3.1 product.

Existing 3.1 users will be able to migrate directly to Version 2001 but, in order to support the new APIs, those users will have to move into 4.1 first, according to Markle.

TCPaccess 4.1 will be priced between $18,000 and $62,000, depending on processor size. Current TCPaccess users can upgrade to 4.1 for no charge. TCPaccess 2001 will be available in the second quarter of 1997. Pricing has not been set.

✆Interlink: (800) 422-3711.

SunSoft lights up intranet mgmt. wares

By Jim Duffy
Mountain View, Calif.

SunSoft, Inc. recently rolled out products aimed at better managing networks and systems that make up an intranet.

For enterprise management, SunSoft unwrapped Solstice Enterprise Manager (SEM) 2.0, a distributed, scalable, object-oriented platform for managing intranets with tens of thousands of nodes.

SEM 2.0 features intelligent scripting and an integrated help desk capability.

Though SEM 2.0 has been in the making for nearly two years (*NW,* Feb. 6, 1995, page 1), SunSoft still cannot identify any users deploying the product for management of their internal nets and intranets. Vendors, including SunSoft's network management rivals, usually release the names of beta-user references once a product is announced and ready to ship.

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The company claims it has some takers in the financial and telephone company markets, and did cite Hughes Network Systems, Inc. (HNS) as a "customer." But Michael Skeith, vice president of software development at HNS, said his company acquired SEM 2.0 to resell under an OEM arrangement, not for managing the HNS internal net.

SunSoft may never be able to name any SEM 2.0 end users, observers noted. Some potential customers, such as SunSoft's installed based of SunNet Manager users, snapped up alternatives while SEM went through its lengthy development period (*NW*, Nov. 25, 1995, page 17).

During that period, other users and independent software developers became increasingly disenchanted with management platforms in general and started looking to the World-Wide Web for scalable distributed management (*NW*, May 13, page 1).

Given those two scenarios, SEM's window of opportunity may have already closed. Nonetheless, SEM 2.0 is available now at a cost of $22,500.

For security management, SunSoft rolled out Solstice Security Manager 4.3, which lets network administrators control inranet logon procedures. Security Manager 4.3 is priced from $495 to $7,995 and will be available in November.

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- **Solstice Security Manager 4.3** – Intranet access authorization package
- **Solstice Job Scheduler Pro 3.3** – Schedules, monitors and reports on jobs running on licensed intranet clients

Lastly, SunSoft unveiled Solstice Job Scheduler Pro 3.3, a repackaged version of Platinum Technology, Inc.'s Autosys scheduling software.

The software costs $10,500 for a single-server license, while a client license is priced at $1,350. It is available now.

☎SunSoft: (415) 960-3200.

Defense

Continued from page 17

"The domestic growth in DOD's unclassified data is unmanageable with routers alone," said William Barattino, head of DISA's Center for Systems Engineering, in a briefing at the recent NetWorld+Interop 96 show in Atlanta.

For example, the NIPRNET network connects several hubs of the Defense Finance and Accounting Service, which is responsible for disbursing paychecks to the armed forces and making payments to vendors.

Both Sprint and MCI have been chipping away at AT&T's dominance of day-to-day Defense traffic, with MCI recently winning a bandwidth management contract for the new Defense Information Systems Network (*NW*, Sept. 16, page 33).

DISA was bound and determined to move to ATM by Oct. 1 to accommodate the growth in traffic, Barattino said, even though the ATM Forum has not completed the Multi-Protocol over ATM standard. "We don't have the luxury of waiting until all the standards are ready," Barattino said.

So the initial implementation uses the ATM Forum's LAN Emulation specification — LANE 1.0. "As a near-term decision, we're implementing LANE 1.0 as a protocol on our ATM backbone," Barattino said.

In addition to the 10 NIPRNET nodes, the fully meshed Sprint ATM backbone connects each site with Sprint's network access point for Internet traffic in Pennsauken, N.J. (see graphic, page 17).

To avoid local exchange bottlenecks, Sprint worked with local exchange carriers (LEC) at each of the 11 nodes to provide DS-3 ATM access circuits rather than traditional DS-3 private lines to Sprint's ATM switches. According to Mike Baxter, a senior government accounts manager for Sprint, in some cases that meant using an alternate provider. ■

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INTERNETWORKING MONITOR

Pick a switch, any switch

When it comes to token-ring switching, does it matter which switch you pick? Judging by the actions of several prominent vendors, the answer would seem to be "No, one is just as good as another." The cross-licensing, partnering, OEM and acquisition activity in this space is mind-boggling.

What is behind all of this? A captive audience of network managers for whom token-ring switching is just about the only option for a performance boost, short of a forklift upgrade to ATM. But as ATM becomes more attractive, the window of opportunity for token-ring switches begins to close. Rather than engage in protracted battles against one another, vendors would rather capitalize on what is perhaps the final surge of interest in token ring.

The technological battle lines drawn a year ago have all but disappeared. No longer do we endure discussions about the trade-offs between cut-through and store-and-forward switching or discussions of source route vs. transparent bridging. Even price per port is not as hotly debated. Instead, many vendors will just sell you whatever you want.

Building upon technology licensed from Ethernet switch pioneer Kalpana (later acquired by Cisco), IBM came out with an inexpensive, eight-port switch that, ironically, did not implement the source route bridging protocol that IBM forced on the industry a decade ago.

This high-performance, low-latency cut-through switch set a new price/performance level in the industry and a number of vendors acted as OEMs. If your shortlist consists of IBM, Proteon, Olicom, UB and Andrew switches, your job is easy: All of these products are the same.

Kevin Tolly

The IBM offering was nearly the polar opposite of the Centillion SpeedSwitch 100. The Bay box cost more than $2,000 per port (compared to IBM's $600 to $700, which has since been lowered) and implemented store-and-forward, source route switching. Here was an opportunity to redefine the market.

Instead of squaring off for a fight, the vendors sat down for a latte. They now resell each other's boxes. Recently, IBM and Xylan agreed to what, in effect, is a technology merger. Now customers can buy a third token-ring switch from IBM.

I've lost track of how many token-ring switches can be had from Cisco. Through its acquisition of Kalpana, Cisco acted as an OEM for the IBM 8272, which it sold as the Catalyst 2600. Cisco's first high-profile move was to partner with Madge Networks in 1995.

The Madge romance cooled and, earlier this year, Cisco said Olicom ASIC technology would be the basis for a future Cisco desktop token-ring switch as well as for Catalyst 5000 modules. But before any products appeared, Cisco bought out Nashoba Networks. The company's flagship product? A store-and-forward token-ring switch now sold as the Catalyst 1800.

It's anyone's guess what technology will ultimately show up in the products. But it probably doesn't matter; I've long held the view that biggest gains are made by simply moving from shared to switched token rings. From the looks of things, I'd say most vendors concur.

Tolly, NW's new WAN columnist, is president of The Tolly Group, a strategic consulting and independent testing firm in Manasquan, N.J. He can be reached at (908) 528-3300 or at ktolly@tolly.com.

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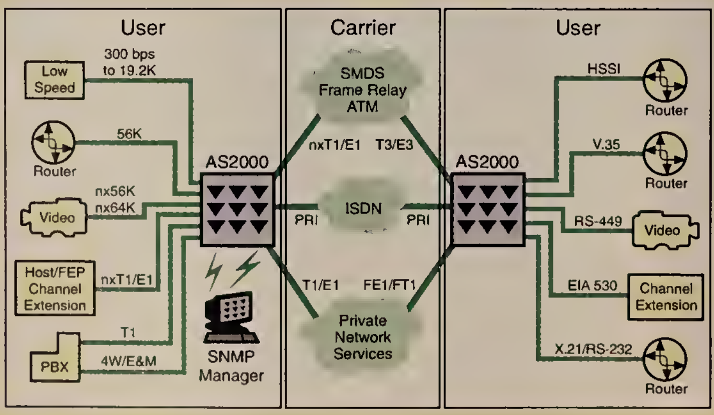

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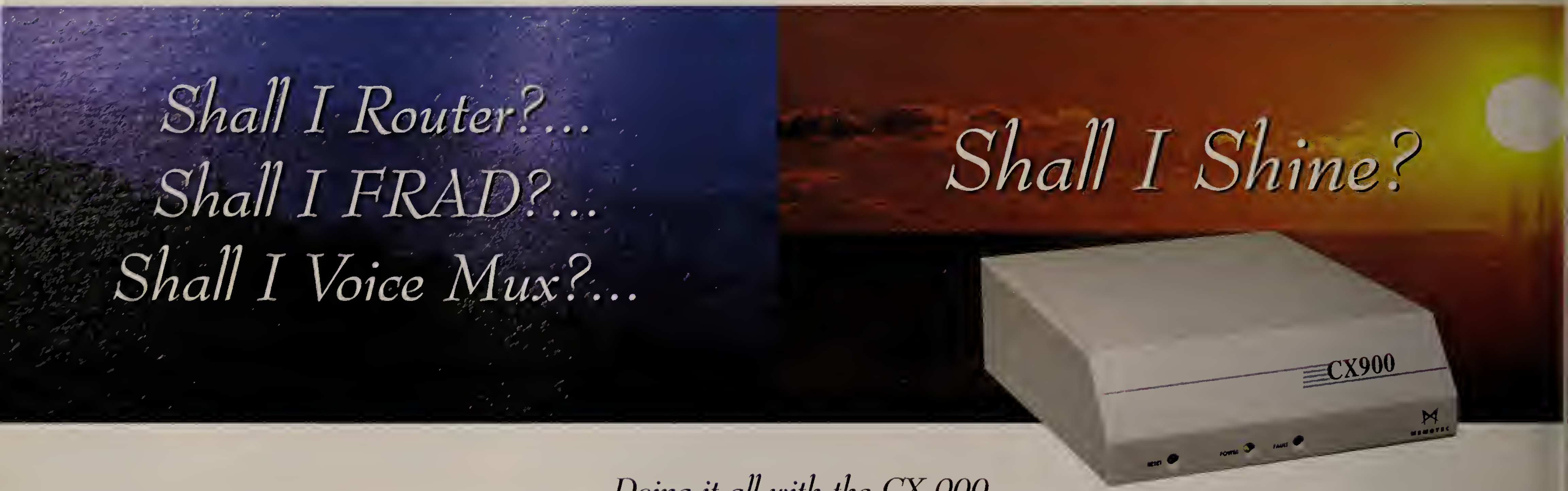

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Carrier Services

Covering: Local and Long-Distance Services • Value-Added Networks • Cable, Satellite and Wireless Networks • Regulatory Affairs • Carrier-Based Internet Services

Briefs

MFS Communications Company, Inc. *last week announced MAE New York, its seventh U.S.* **Internet traffic exchange point,** *to be run by MFS operating unit MFS Telecom. The company said it has signed on several Internet service providers to hand off packets to each other's services over Ethernet, FDDI and High Speed Serial Interface connections. The exchange point is set to begin operation tomorrow.*

Teleglobe USA, Inc. *recently received a global facilities-based license from the Federal Communications Commission, which allows Teleglobe to own and operate* **cable and satellite links** *between the U.S. and most other countries. To date, Teleglobe was only allowed to do so between the U.S. and Canada. Teleglobe President Paolo Guidi said the company will sell some voice and private-line services to corporate customers. However, he said, the company will focus mostly on reselling capacity to U.S. carriers, such as regional Bell operating companies looking to "bundle" end-to-end services.*

Teleglobe's *Guidi*

AT&T Business Network, *a service of Nets, Inc., last week launched New Business Leads, a service that allows business professionals to download, for a fee,* **marketing leads** *and demographic data from the Web.*

AT&T Business Network: http://www.bnet.att.com.

Frontier Communications *last week said it is now offering* **local telephone service** *in several cities in Massachusetts as part of its telecommunications portfolio, which includes long-distance, toll-free, paging, cellular and voice mail services. It already offers local service in six other states.*

Frontier: http://www.frontiercorp.com.

AT&T rounds out E-commerce line

Company offers transaction processing, 'Net insurance and promotional incentives.

By Joanie Wexler
New York

AT&T is flexing its industry muscle to boost the use of electronic commerce.

The company last week said it is now offering insurance against Web server downtime, lost orders and credit card fraud over the Internet, as well as promotional incentives to Web surfers and back-end transaction processing services. Analysts said that with AT&T's reach, the moves could make the fledgling commerce market surge.

AT&T has also added meat to its basic commerce environment. Its new SecureBuy offering, for instance, adds long-awaited transaction processing capabilities to AT&T's Easy World-Wide Web hosting services.

In addition, AT&T has integrated Open Market, Inc.'s OM-Transact software into its server farm. The software forges links to financial networks, which will authorize a credit card and approve a user's credit line based on encrypted information sent from AT&T.

It also issues digital receipts shoppers can use to check if their order has been shipped, explained Kathleen Earley, vice president of AT&T EasyCommerce Services. She said if an order does get lost, AT&T will pay the merchant for the item up to a month's SecureBuy fee.

Based on a one-year contract, SecureBuy costs $395 a month for AT&T business customers and $495 for non-AT&T business customers, plus a onetime $500 registration fee. For users on a month-to-month plan, the price is $595 per month, plus a one-time $1,000 fee.

SecureBuy also extends AT&T's Universal Card guarantees. If the credit card number of a user buying from an AT&T-hosted SecureBuy site is stolen and abused, AT&T will pay the $50 liability for the cardholder.

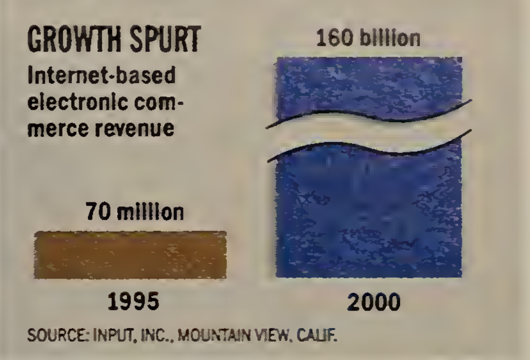
"Internet security is really not a technical issue," said Harry Fenick, an analyst with Zona Research, Inc. in Redwood City, Calif. "AT&T has taken away all the hue and cry, panic and fear with a simple insurance policy."

As part of SecureBuy, AT&T is trying to "make buyers out of browsers," said AT&T Chairman Robert Allen. Shoppers who register with AT&T as 'Net shoppers by May 31, 1997, get 100 minutes of free AT&T long-distance calls once they spend $25 at an AT&T-hosted site. Merchants who sign up by Jan. 31, 1997, get 500 online transactions per month processed free for one year.

Once users register at a site, their credit card numbers stay stored in an AT&T commerce server, so the shopper never has to type the information again.

This "puts AT&T ahead of other [verification services] like CyberCash, who can't track repeat shoppers," said John McGann, principal consultant at Input, Inc. in Mountain View, Calif.

For merchants, an Internet Server Availability guarantee means that if they have any downtime, they will be reimbursed one month's service fee. ■


GROWTH SPURT
Internet-based electronic commerce revenue

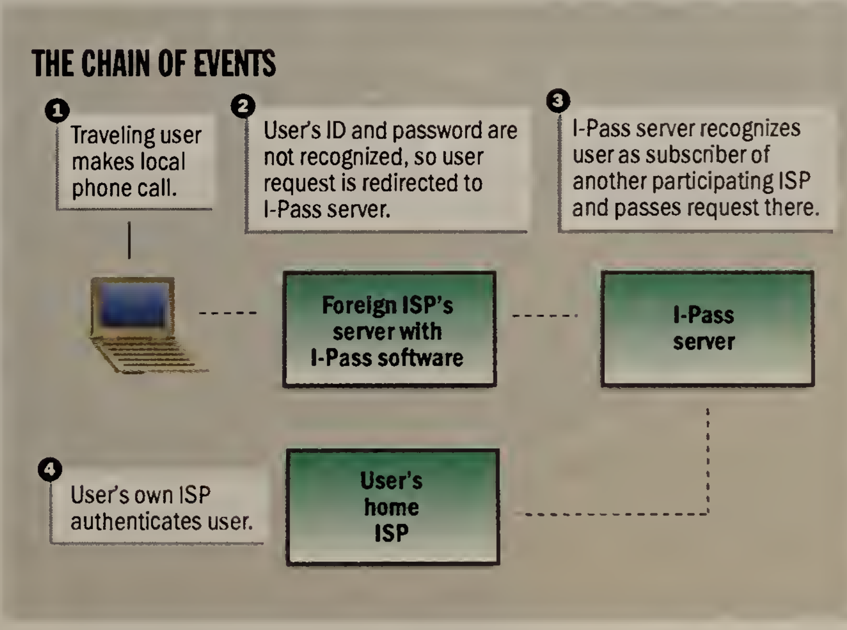
SOURCE: INPUT, INC., MOUNTAIN VIEW, CALIF.

Internet users free to roam

By Joanie Wexler
Palo Alto, Calif.

A breakthrough is being made in pulling together Internet backbones from different service providers.

A new company that ultimately allows end customers to roam among multiple Internet service providers' networks worldwide will formally introduce itself late this month. The I-Pass Alliance, Inc. is serving as a broker that allows the cross-authorization of users and payment settlement among Internet providers.


THE CHAIN OF EVENTS
1 Traveling user makes local phone call.
2 User's ID and password are not recognized, so user request is redirected to I-Pass server.
3 I-Pass server recognizes user as subscriber of another participating ISP and passes request there.
4 User's own ISP authenticates user.
Foreign ISP's server with I-Pass software
I-Pass server
User's home ISP

The effort could be a boon for some. "Users who travel extensively and don't have a CompuServe account find roaming a huge issue," noted Greg Wester, research director of interactive services at The Yankee Group in Boston. However, he said, "the number of those users is small."

I-Pass said it figures that between 5% and 8% of Internet users require 'Net access outside of their ISPs' service area.

I-Pass charges no up-front fees to ISPs wanting to participate and provides them with free user authorization software. The company simply takes a fee when an end customer uses the roaming service, explained Chris Moore, I-Pass president.

His company is now in field trials with about 20 large ISPs in the U.S., Europe and Canada, he said. The following ISPs have signed on: InterNex Information Services in the U.S., HookUp Communications in Canada, TCP/IP GMBH in Germany, Dacom in Korea and others in Australia, China, Hong Kong, Japan and Singapore.

Customers of a participating ISP get a list of other participating ISPs' local access numbers they can dial for 'Net access from any city. When a user enters his ID, it gets sent to I-Pass, which in turn relays it to the user's home ISP for authorization. The two ISPs involved and I-Pass all can record details of the transaction for settlement purposes, Moore explained.

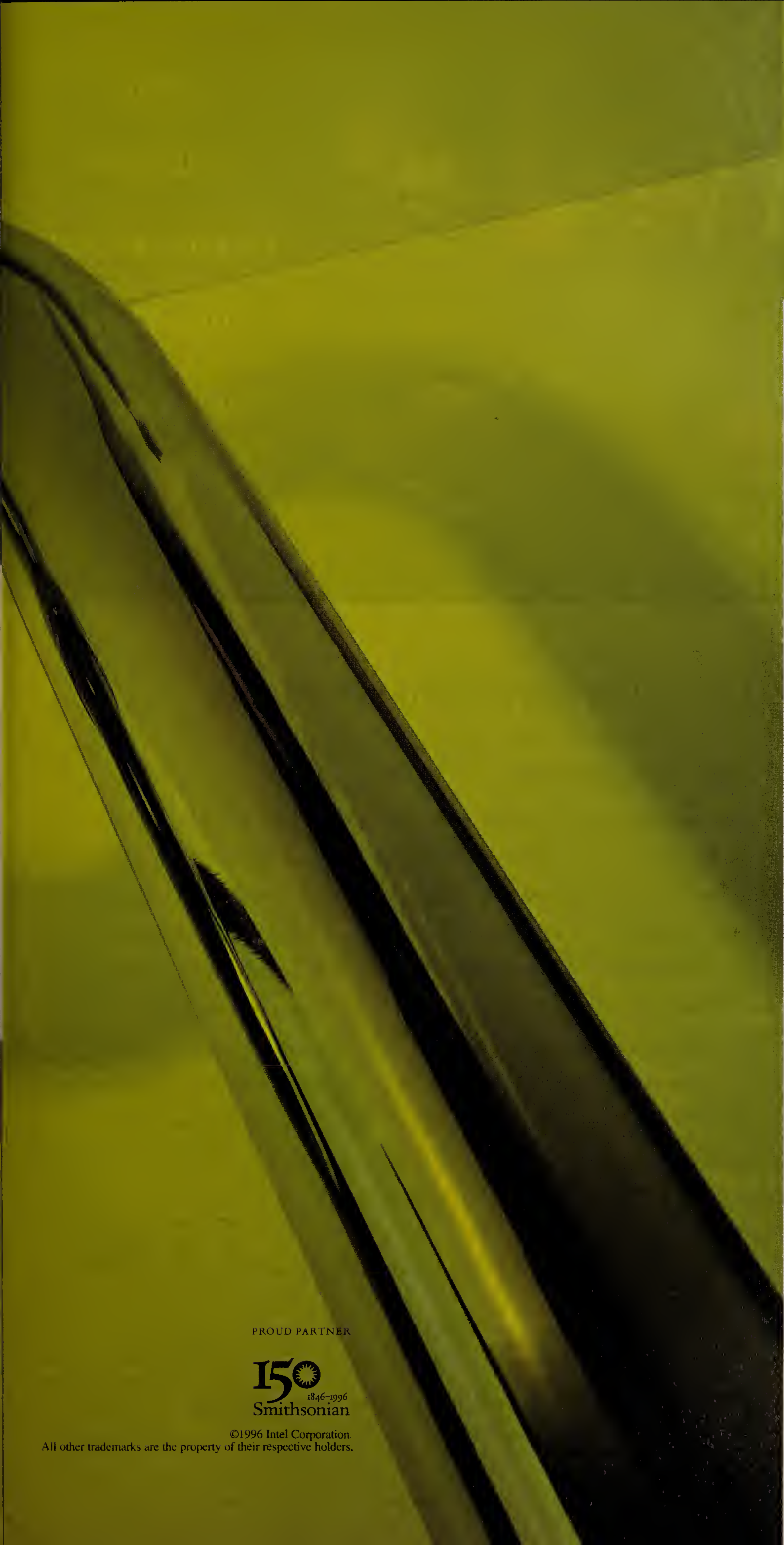
Several large ISPs, such as UUNET Technologies, Inc. and PSINet International, Inc., already offer their own roaming services and are feverishly building out their own networks to span multiple countries. UUNET, the furthest along, has more than 500 points of presence spanning eight countries. Still, there are more than 200 countries in the world.

"This would be a good solution for 'filling in' where UUNET doesn't have a presence," a UUNET spokesman said.

The I-Pass effort is similar to that of the Global Reach Internet Consortium (GRIC), led by regional ISP Aimnet Corp. in Santa Clara, Calif. (*NW*, Aug. 26, page 24). The 11-and-counting worldwide GRIC partners use software made by Aimnet that authenticates users roaming their networks and handles cross-billing and other services.

Moore said he has discussed the possibility of GRIC being an I-Pass customer with Aimnet to quickly broaden GRIC's set of access points, but "no deal has been signed yet." ■

Still plumbing with 10Mbps?



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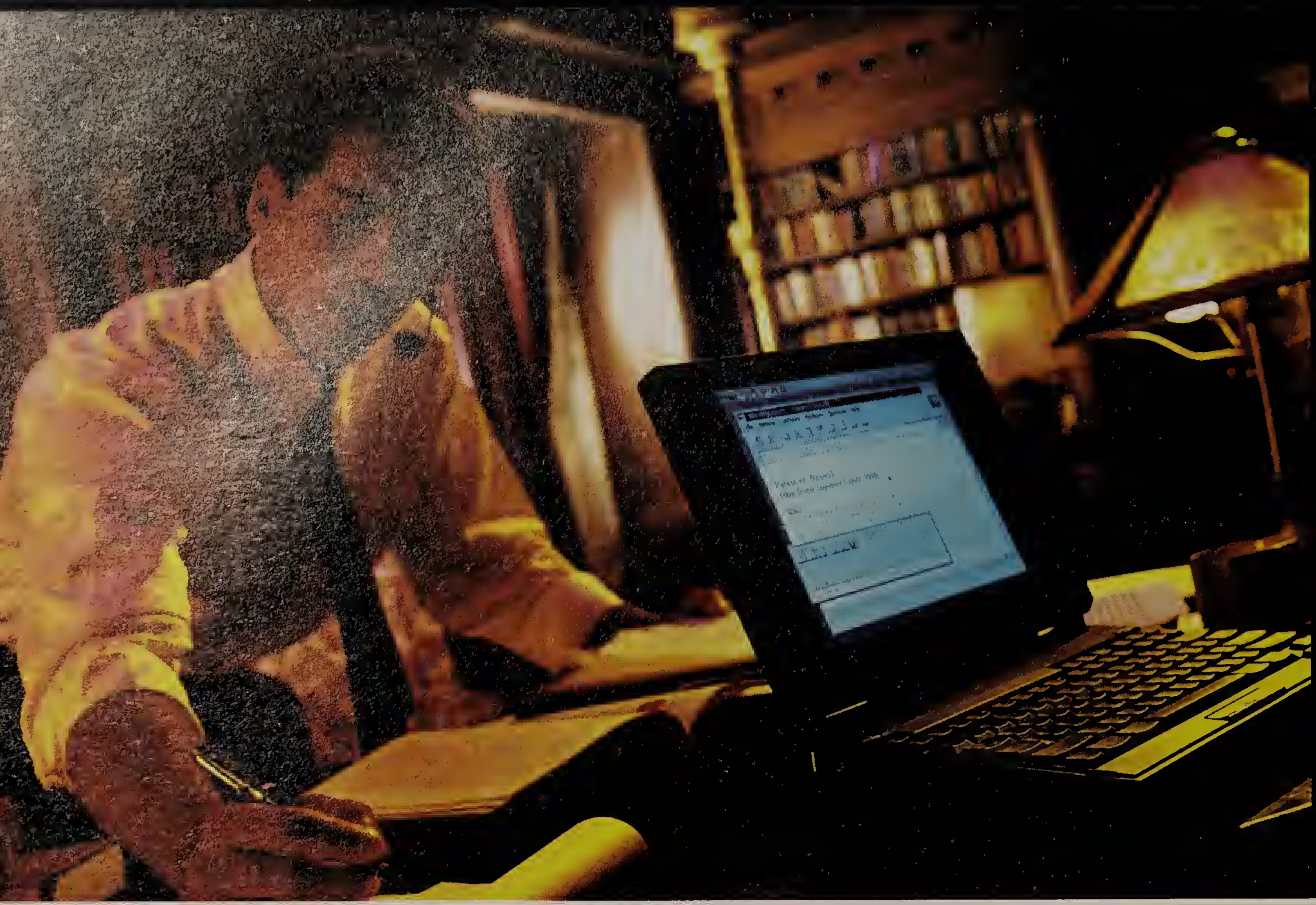

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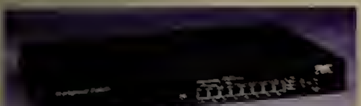
Local Networks

Covering: Servers • Operating systems • LAN management
Hubs • Switches • Adapters and other equipment

Briefs

■ **Standard Microsystems Corp. (SMC)** *last week introduced the* **EZ Switch 8,** *an aggressively priced Ethernet workgroup switch that features eight dedicated 10Base-T ports*



for hub, server or desktop connections. The switch, available this month, costs $1,000, which translates into $125 per port.

SMC: (800) 762-4968.

■ **Sun Microsystems, Inc.** *got a jump on Halloween earlier this month, dressing up its Ultra Enterprise 4000 and 5000 servers in Internet costumes. The* **Netra Internet Server** *4000 and 5000 come bundled with Netscape Communications Corp.'s SuiteSpot Web server suite and are based on the Ultra hardware architecture. The additions to the Netra line are designed for companies looking to build large public World-Wide Web sites.*

The company also announced the Netra 2/1200, designed for running departmental intranets. Pricing for the servers begins at $7,495.

Sun: (415) 960-1300.

■ **Microsoft Corp.** *has released beta code for an updated version of its* **Index Server,** *which provides catalog and search capabilities for all data stored on Windows NT 4.0 servers. The key feature of this update is that it returns all full-text searches with key words highlighted, making it easier for users to find the information they need. The company released Index Server 1.0 last month, two weeks after Windows NT Server 4.0 was launched. The new beta can be downloaded from Microsoft's Web site (www.microsoft.com/ntserver/search/step111.htm).*

Microsoft: (206) 882-8080.

Silicon Graphics' Origin is new server species

By John Robinson
Mountain View, Calif.

Silicon Graphics, Inc. (SGI) last week announced a server line built around a new system architecture and interconnect technology for clustering systems out of the box.

The Origin server family consists of the Origin200 workgroup server and the Origin2000 high-performance and supercomputing servers, which can be clustered to provide more power.

The backbone of the clustered product line is SGI's new Scalable Sharedmemory Multiprocessor architecture, a building-block approach that relies on Cray Research, Inc.'s CrayLink interconnect technology to cluster servers. Cray is SGI's supercomputing subsidiary.

Read a technical overview of Origin technology.

Enter the number to the right in the DocFinder box on the home page.

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The architecture can ultimately scale a system to 1,024 processors. Each building block or module in the architecture is a single computer with two MIPS R1000 processors, which can be connected with CrayLink and appear as a single shared-memory system.

The Origin2000, for example, supports as many as eight 195- or 180-MHz R1000 processors, with 4M bytes or 1M byte of cache, respectively. Up to eight systems can be connected via CrayLink to scale the system to 64 processors and 128G bytes of RAM.

On a larger scale, the Cray Origin2000 systems scale from 65 to 128 processors for high-performance computing.

On the workgroup front, SGI is pushing the Origin200, its entry-level Origin system, which supports up to four 180-MHz processors and 4G bytes of RAM.

Both the Origin200 and Origin2000 models come standard with one 10Base-T/100Base-T Ethernet interface and one 40M bit/sec UltraSCSI interface. The Origin200 also features a 20M bit/sec fast/wide interface.

All systems in the Origin series run SGI's Cellular IRIX operating system. All servers in the Origin family are designed to run data warehousing, Web and decision-support applications.

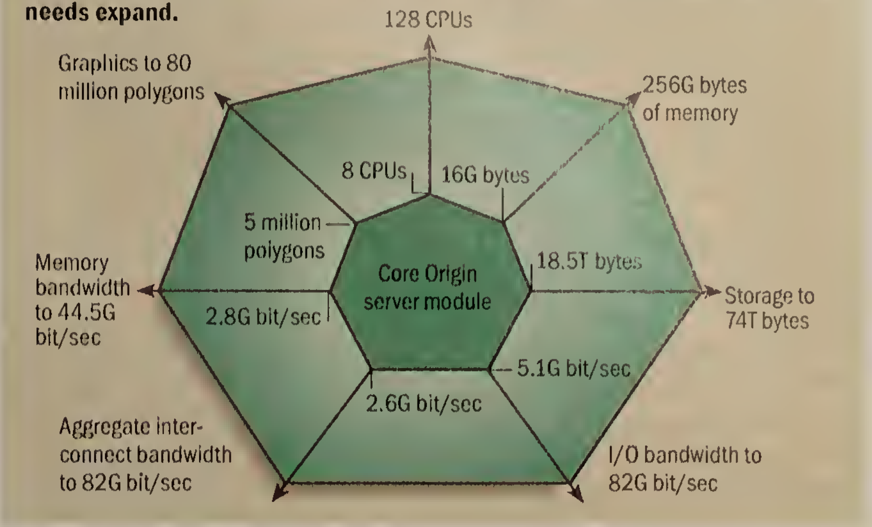
The announcements came on the heels of a massive SGI recall of defective R1000 processors and forecasts of below-expected earnings for the first quarter.

Pricing for the Origin200 systems starts at $11,395 for the Origin200 and $29,900 for the Origin2000 systems. Both will ship this quarter. Cray Origin2000 servers start at $2 million and will be available in mid-1997.

©SGI: (415) 960-1940.

SERVER EXPANSION PLAN

Using a building-block approach, Silicon Graphics' Scalable Sharedmemory Multiprocessor architecture lets customers expand their Origin servers as their needs expand.


128 CPUs
Graphics to 80 million polygons
256G bytes of memory
8 CPUs
16G bytes
5 million polygons
Core Origin server module
18.5T bytes
Memory bandwidth to 44.5G bit/sec
2.8G bit/sec
Storage to 74T bytes
5.1G bit/sec
2.6G bit/sec
Aggregate interconnect bandwidth to 82G bit/sec
I/O bandwidth to 82G bit/sec

Sun exec prescribes heavy dose of Java at Unix Expo

By John Robinson
New York

Maybe it was the free cappuccino and latte, but the Sun Microsystems, Inc. booth at Unix Expo Plus here was packed with attendees after a rousing Java-centric speech by Ed Zander, president of Sun Microsystems Computer Corp.

In the first of several keynotes at the conference, Zander outlined on Tuesday the future of the network computer as it relates to Java and called upon conference attendees not to heed the warnings that Windows NT will usurp Unix in the network market.

"Think thin clients, big pipes and fat servers."

Edward Zander, president of Sun Microsystems Computer Corp.

STEVEN BORNS

"Unix is alive and well," Zander told the crowd, citing the staying power of the operating system in an industry that changes flavors every year. "We think there is a heck of a lot of headway and runway left in the Unix marketplace."

Webtop option

Zander took more than a few pokes at Microsoft Corp. Chief Executive Officer Bill Gates, who Wednesday tried to boost confidence in NT and Unix coexistence during an early morning keynote. Zander said Microsoft continues to load the desktop with unnecessary software, driving up the cost of business computing. Citing a Gartner Group, Inc. report, he said the average cost of operating a PC in the business space is $13,000 per year, a cost that Sun's network computing model can reduce by 70% through "Webtop" thin clients sucking applications off a server.

"The best thing to happen to Sun in the industry was Windows 95," Zander said. "It made people stop and ask, 'Do I really need that?' "

Some show attendees answered yes. Rick Strom, director of system software marketing for Data General Corp. in Westborough, Mass., said while there is a place for the thin client model in some businesses such as banks, Webtops will not displace Microsoft software on the PC.

"You start taking things away from people on 'the desktop,' and they are not going to be very happy," Strom said. "I don't think [the Webtop is] going to be widely adopted, but there is a place for it."

Zander outlined three driving forces behind Sun's network-centric computing model:

■ **Expansion of the Internet.** Electronic commerce and the proliferation of intranets in the workplace will force applications onto servers and away from the desktop.

■ **Bandwidth ubiquity.** Adoption of fiber and ISDN is more commonplace, and bandwidth requirements will increase as high-speed access is demanded by the PC user.

■ **The Java net application paradigm.** Sun will continue to embed its language in everything from cellular phones to pagers. Zander also claimed that the Java paradigm solves problems of security, application distribution, cost per seat and client administration.

In a final appeal to his Unix audience, Zander challenged developers to continue writing for Unix, taking advantage of its scalability, security and manageability over NT.

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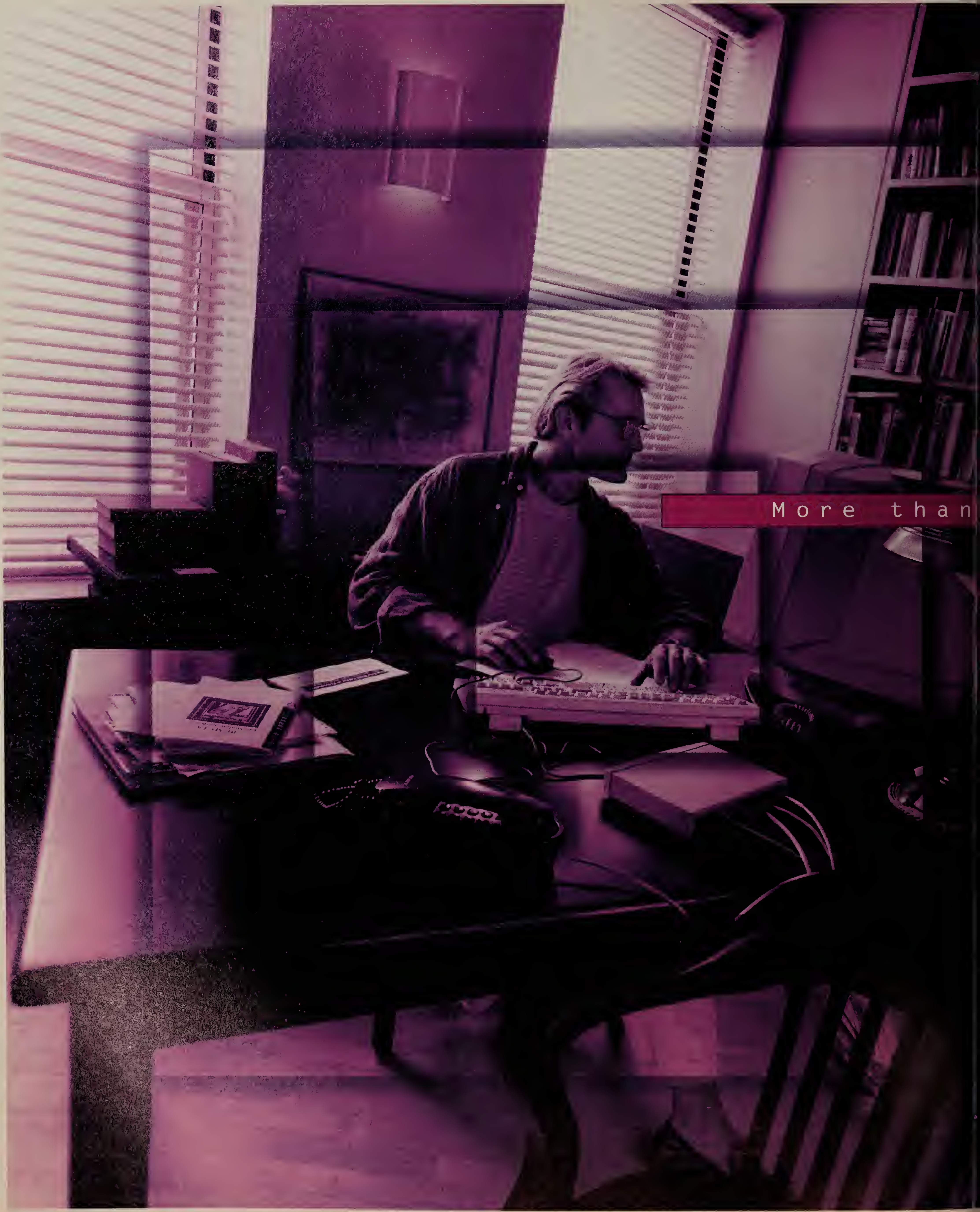
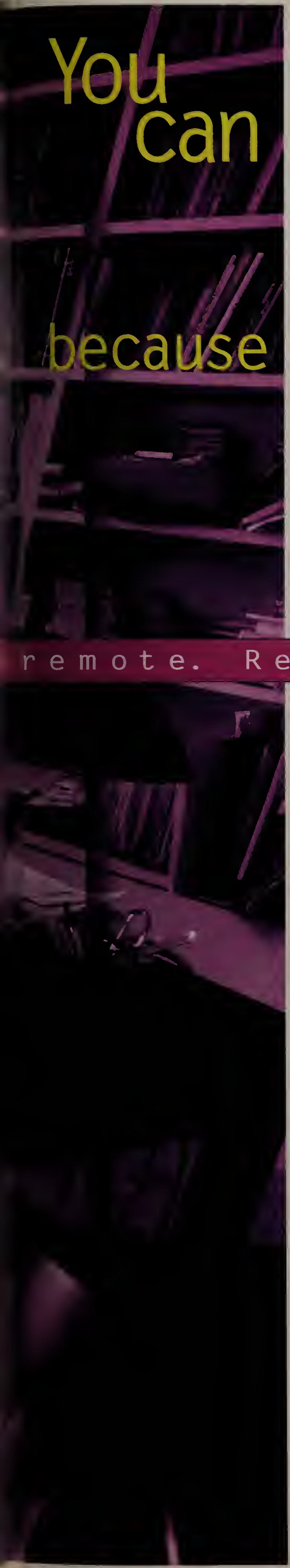


More than



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WIRED WINDOWS

Microsoft's in the money again

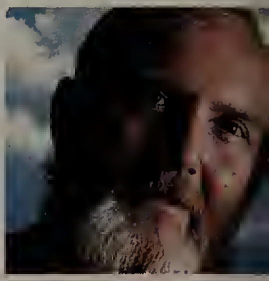
It's been a year and a half since Microsoft Corp. made its ill-fated bid to acquire Intuit, Inc. and its flagship Quicken personal finance software. Once the government's antitrust folks quashed the deal, the companies went their separate ways, following different development paths.

Recent announcements from both point to the direction they are taking in personal finance and corporate electronic commerce in the Internet Age.

Quicken remains the top-selling software package in its category, helping people maintain their bank and brokerage accounts, pay their bills and keep better track of their money. Recently, Intuit launched InsureMarket — the first Web site to sell insurance. Intuit is expanding the diversity of its benefits to maintain Quicken's prime market position.

Microsoft, of course, lost no time after the antitrust action in bringing its Microsoft Money 95 product to market — even giving it away for a short time.

Now the company has launched Money 97, which raises the bar by encompassing Internet banking, first outlined by Microsoft in its Open Financial Connectivity specification in December. The spec outlines protocols and methods to be used to conduct personal financial transactions as well as institution-level transactions securely over a network.



Dave Kearns

With partners such as Visa International, Inc. and American Express Co., it appears Microsoft will be relatively successful in this market. It should also mean that Microsoft can count on a small — but significant — piece of every financial transaction that occurs over the Internet.

As if banking were not enough, though, Microsoft has launched another electronic commerce initiative — this time in the transportation industry. The Value Chain Initiative was announced as "an alliance of Microsoft Solution Providers committed to developing integrated NT-based solutions designed to redefine transportation logistics, the length and breadth of the supply chain."

This may have come as a bit of a shock to those in the electronic commerce and electronic data interchange communities that have been working on just such an initiative for a few years. Nevertheless, leading EDI software vendors such as GE Information Services and Supply Tech, Inc. took part in the announcement along with hardware vendors Compaq Computer Corp. and Digital Equipment Corp.

Tip of the week

Microsoft is releasing components of its Normandy Internet server software for Windows NT. Already available for download is a news server, soon to be followed by a chat server and a replication server. For details and preview versions, visit Microsoft's Web site (http://www.microsoft.com/internet/normandy/).

One thing to keep in mind regarding Microsoft's ambitious plans in the electronic commerce area: Some of the nastiest flaws in recent Microsoft operating systems have involved security. You'd do well to look twice at commerce solutions from a company that keeps forgetting to lock the back door.

Kearns, a former network administrator, is a freelance writer and consultant in Austin, Texas. He can be reached at dkearns@msn.com.

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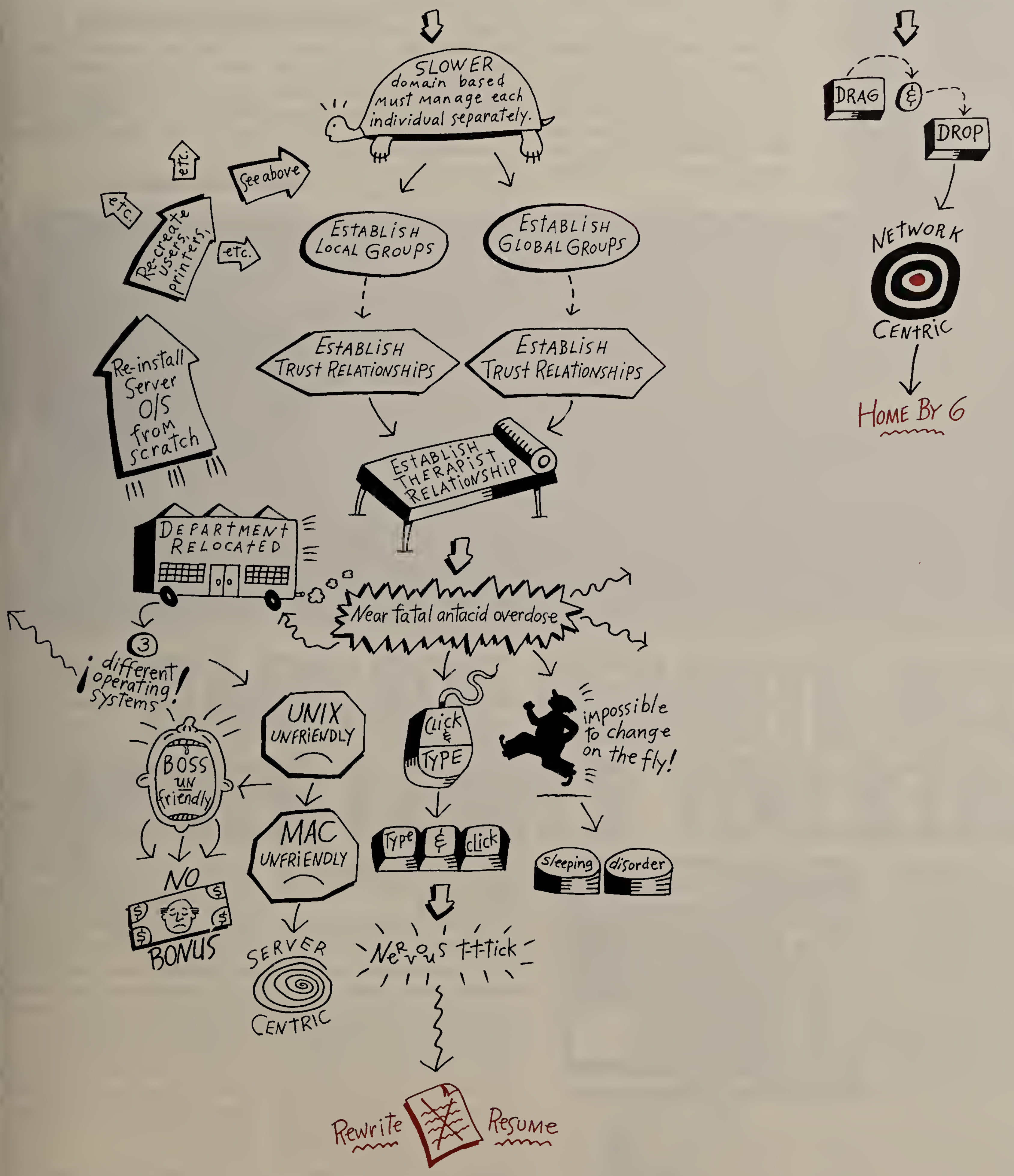

Need more proof of Novell's superiority? Visit www.novell.com/challenge for the results of "The Fight of the Century," the Novell/Microsoft Challenge at Networld+Interop September 18. Due to the fight's length, it'll only take you a moment.

Novell Directory Services

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Life with a mixed NOS environment

Users want more tools to eliminate need for parallel network administration.

By Christine Burns

Surely life would be simpler if every operating system on your network came out of the same color box.

But whether necessitated by application support, staff expertise or a change in corporate direction, the existence of multiple NOSes is a fact of life for most network administrators today. And coexistence is hardly ever peaceful as administrators must succumb to the daily trials of managing different transport protocols, dissimilar servers and disparate directory systems.

“Every major company out there has multiple NOSes. They are trying to address migration towards a single platform, but the difference in the, applications and in staff expertise are going to necessitate different operating systems for a long time to come.”

Ed Mier, president, Mier Communications, Inc.

Customers are quick to point to favorite commercial products or homegrown solutions that help them handle pieces of this management puzzle. But other than a healthy dose of aspirin, administrators across the board say there are not enough tools available to help them cope with all the hassles of a multi-NOS environment.

“We’re basically maintaining parallel universes out there,” said Scott Davis, a systems administrator with the Women’s Health Initiative, a nationwide organization based in Seattle.

Davis oversees about 120 Novell, Inc. NetWare and Microsoft Corp. Windows NT servers, which are spread across 50 sites and connected via a frame relay network. The network traditionally has been based on NetWare, but the Women’s Health Initiative installed the Windows NT servers in April to support a Microsoft Exchange electronic messaging system.

Davis said it would definitely be more economical from a labor cost perspective to adopt a single NOS. “But on the other hand, it’s not a trivial task, and it would take years to migrate all of our applications from NetWare to NT,” he said.

Davis is not alone in his resignation to forge ahead with a multiple NOS environment. Edwin Mier, president of Mier Communications, Inc., a Princeton Junction, N.J.-based network consultancy, said that while most large companies have thought about moving to a single NOS, few are moving quickly in that direction.

“Since there is no single architecture, protocol or product for managing all of these server platform operating systems, companies are forced into distributed management using platform-specific tools,” he said.

End-user management

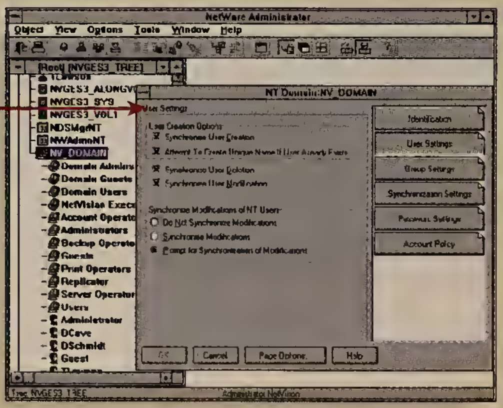
Topping the list of tools needed to manage multi-NOS environments are those for administering end-user stations across platforms.

“Having to set up users on each box is my biggest headache by far,” said Joe Entler, a systems administrator with Monsanto Co., an international holding company in St. Louis, who manages user accounts via both Windows NT server domains and Novell Directory Services (NDS). “I want the ability to set up a user in NDS and have their passwords, accesses and rights filter onto the NT box. Right now, everytime a user’s password expires on one side and he has to change it, he gets locked out of the other side and I get a phone call.”

NETWARE AND NT USERS IN SYNC

NetVision’s Synchronicity helps an administrator deal with the headaches of managing a mixed NOS environment that contains both Windows NT Server and NetWare 4.X servers.

From within NWAdmin, administrators can define what type of Windows NT Server user information is synchronized with Novell Directory Services.



User Settings

User Creation Options

☒ Synchronize User Creation

☒ Attempt To Create Unique Name If User Already Exists

☒ Synchronize User Deletion

☒ Synchronize User Modification

Synchronize Modifications of NT Users

○ Do Not Synchronize Modifications

○ Synchronize Modifications

● Prompt for Synchronization of Modifications

David Hasselbach, a network engineer at the University of Michigan’s medical center in Ann Arbor, is grappling with user administration across a NetWare, Windows NT Server and Banyan Systems, Inc.’s VINES network.

This traditionally has been handled by a few network administrators who are adept at creating and maintaining duplicate user accounts, he said.

“The problem with that approach is we would like to include more detailed user information within directories — more than just a logon name and password — but can’t. Manually synchronizing all that information for 10,000 users across multiple systems is impossible,” he said.

Major NOS and third-party vendors are currently aware of the directory synchronization situation and are working to capture a piece of this market opportunity.

Dale Cave, vice president of NetVision, Inc., a start-up in Lindon, Utah, said his company estimates the market for synchronizing user information between NDS and NT domains will approach $100 million next year.

NetVision will be the first to deliver this capability when it ships a tool called Synchronicity later this month. This tool will allow an adminstrator to manage Windows NT server domains from within the NWAdmin, NetWare’s graphical administration tool. Changes made to NT domain user accounts within NDS using NWAdmin are synchronized with user account information stored on NT Server.

Novell will deliver a similar utility, code-named Tabasco, for integration with its IntranetWare product by year-end. Officials demonstrated a prototype at NetWorld+Interop 96 in Atlanta last month.

Other NOS vendors — such as Banyan and IBM — are looking to layer their directory services on top of NT Server to achieve a common place for user administration. Banyan has already ported its StreetTalk directory service to NT, while IBM is set to deliver a version of its Directory and Security server for NT by year-end.

Microsoft remains the only wild card in this whole synchronization scenario. It is working on its next-generation directory service for Windows NT Server as its competitors work on interoperability with Windows NT’s existing domain-based service.

Microsoft plans to achieve directory interoperability through its Open Directory Service Interface, which affords third-party vendors a common interface across directory services, according to Jeff Price, Windows NT Server product manager. With this interface, developers can write applications that will let administrators manage users across server platforms, he said.

Users are skeptical of the vendors’ willingness to provide complete interoperability between directories in the future.

“I don’t want to have to deal with the hassles of directory synchronization, and I shouldn’t have to in the future,” said Ted Kull, manager of LAN system operations at the Educational Testing Service in Princeton, N.J. He currently uses Banyan’s StreetTalk on more than 60 VINES, Unix and NT servers.

“I should be able to keep the engine I have now, and the vendors should support a common protocol that gives my engine a door to their directories,” he said.

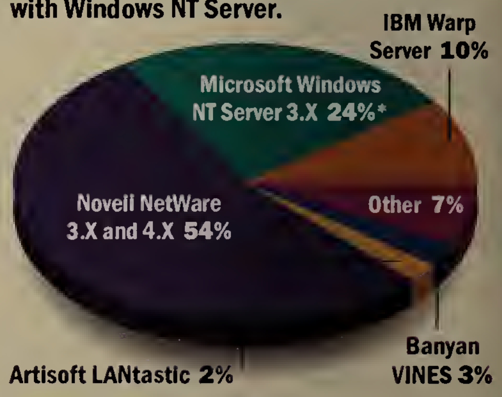
Managing the parts

Resigned to the existence of multiple NOSes in their networks, administrators are not totally unhappy with their options for managing specific parts of the mixed network.

There are products such as Intel Corp.’s LANDesk suite, which aptly manages mixed desktops, and Compaq Computer Corp.’s Insight Manager, which handles administration across different server operating systems.

SHARING THE NOS MARKET

In the first half of 1996, Novell continued to hold onto its top network operating system position even as Microsoft made headway with Windows NT Server.



* Represents NT Server used as a file server, which is approximately 60% of total NT Server shipments.

SOURCE: INTERNATIONAL DATA CORP., FRAMINGHAM, MASS. (SEPTEMBER 1996)

Users are also taking advantage of tools bundled with their NOSes that give them at least some access to users and resources controlled by other operating systems.

George Szatkowski, a senior technical support specialist with Metropolitan Rail Corp. in Chicago, uses the IBM SystemView console shipping with OS/2 Warp Server 4.X to help manage servers and desktops on his Warp Server and NetWare 3.12 nets. However, he said the product is not useful for controlling the Sun Microsystems, Inc. Solaris and Windows NT server machines on the network.

Monsanto’s Entler said he has tested the Gateway Service for NetWare, which ships with Windows NT 4.0, as a means for giving NT users access to NetWare services.

“I’ve had good success with going from NT to NetWare, but the same isn’t true in the opposite direction,” Entler said. “So what good is a one-way gateway when you’ve got users on both sides who need access to both servers?”■

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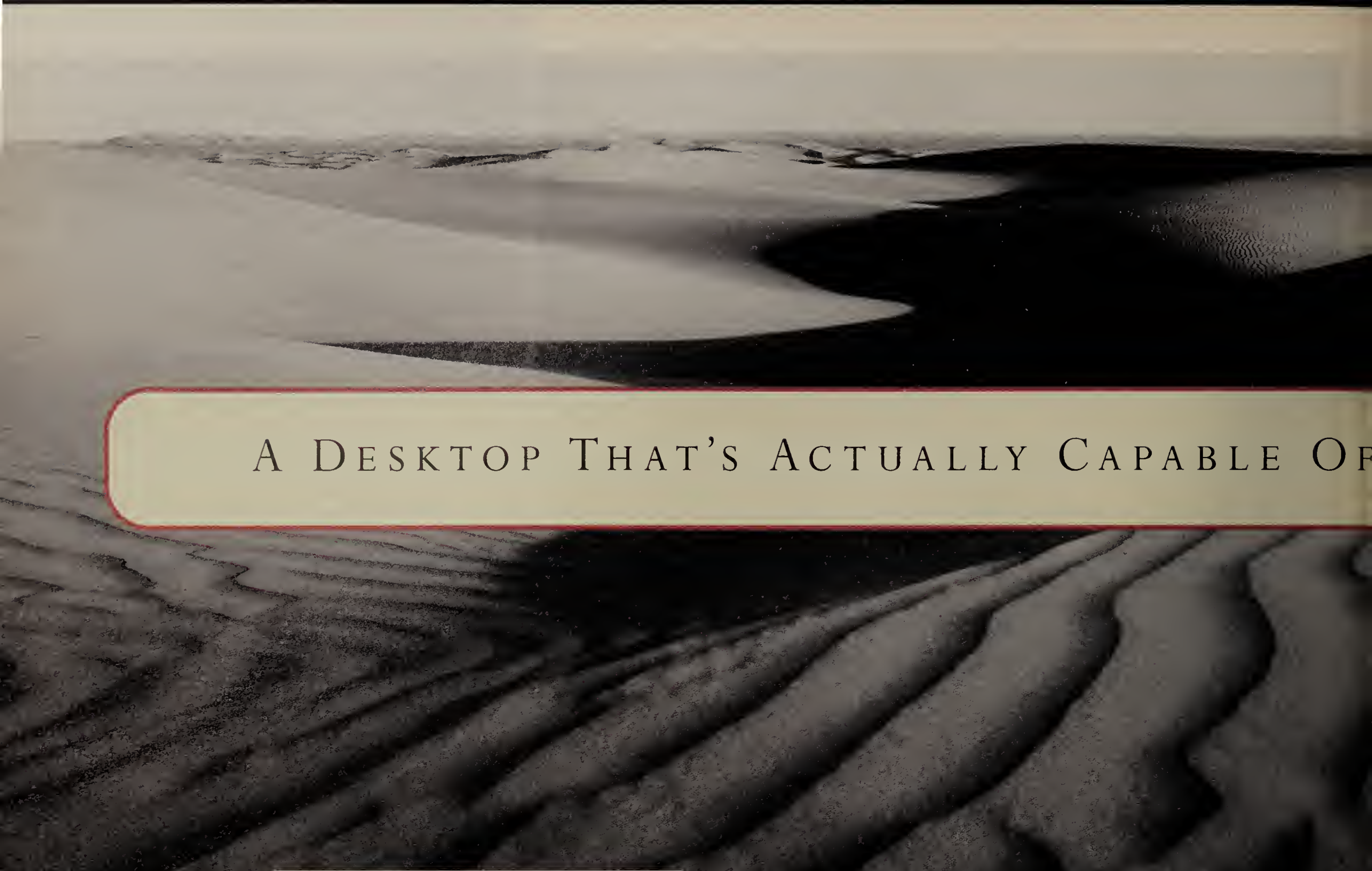

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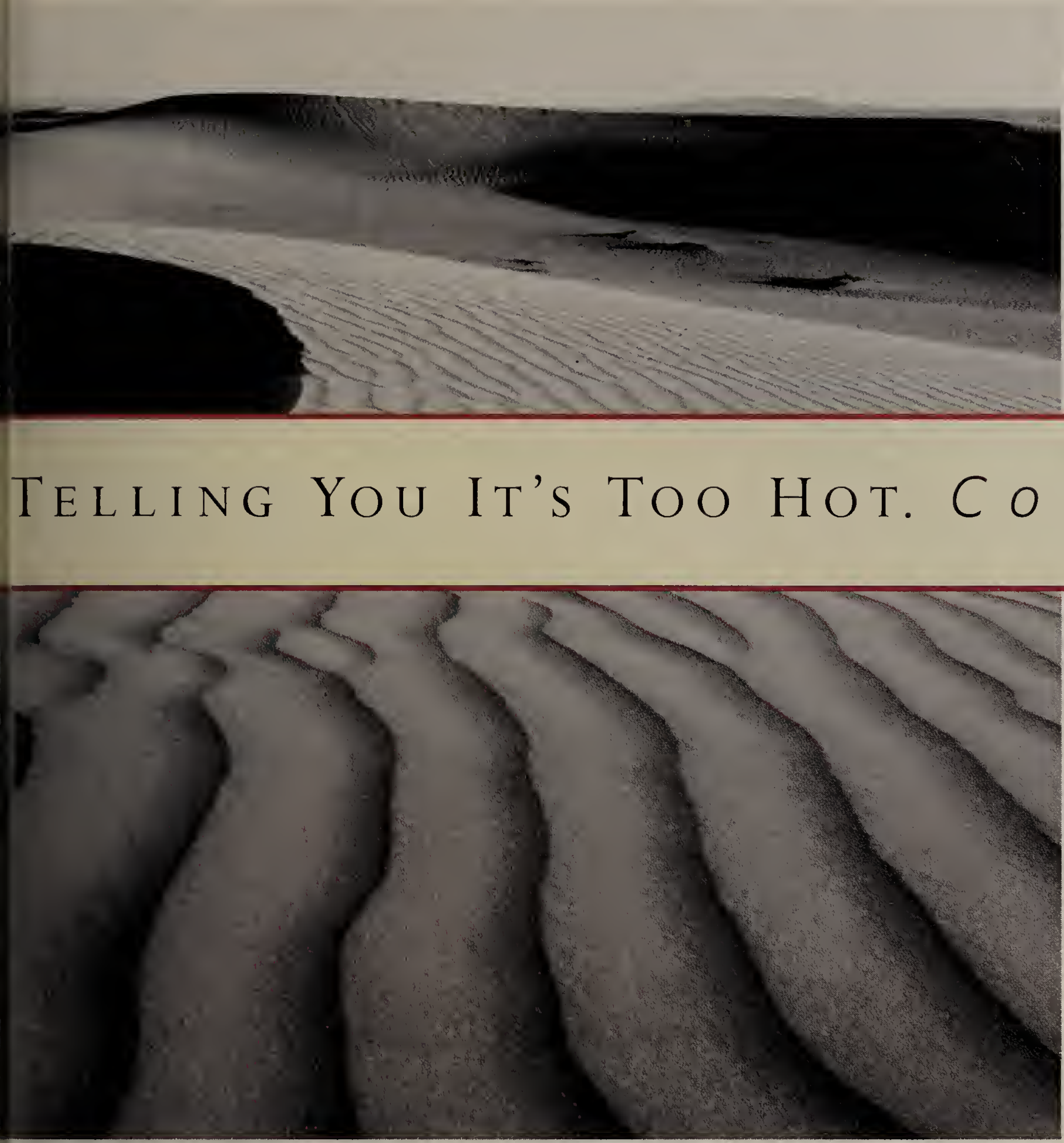

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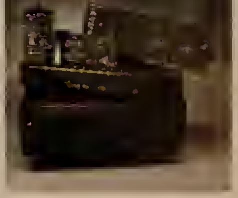

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Client/Server Applications

Covering: Databases • Messaging • Groupware
Conferencing • Imaging • Multimedia • Development

Briefs

■ **NetManage, Inc.** *of Cupertino, Calif., this week will announce Ecco Pro 4.0, a 32-bit version of its* **personal information manager** *that now has tighter links with the company's intranet applications. Ecco users can launch NetManage's Web browser, 'Net mail client and Internet search engine with a single mouse click.*

Version 4.0 also has wizards for sharing information within a workgroup. The software runs on Windows 95 and Windows NT.

Available now, it is priced at $139.

NetManage: (408) 973-7171.

■ **AMP, Inc.** *of Harrisburg, Pa., last week announced the Multimedia Distribution System (MDS), which delivers* **audio and video** *over unshielded twisted-pair networks. MDS is designed to deliver audio and video for a variety of applications, such as videoconferencing, distance learning and corporate training.*

Available now, the price for the MDS installation kit is less than $2,500 and includes one Broadband Uniform Distribution unit.

AMP: (800) 835-7240.

■ **The Association for Information and Image Management International (AIIM)** *has expanded its* **Open Document Management API (ODMA)** *specification with extensions for searching for documents in different repositories. Users of ODMA-compliant applications can now search for and retrieve documents through a Find command, regardless of the document's file format or location on the network.*

More than 100 applications currently support ODMA. The new ODMA query extensions are published on the AIIM Web site (www.aiim.org).

AIIM: (301) 587-8202.

CommTouch vies for spot in 'Net mail market

By Barb Cole
Boston

CommTouch Software, Inc. has an offer for companies looking to deploy Internet mail clients that is hard to beat.

This week, CommTouch will make available on its Web site a free edition of its Pronto mail client for Simple Mail Transfer Protocol and Post Office Protocol 3 (POP3) servers.

The free client is part of a broad push by CommTouch, which has sold more than two million client licenses through OEMs, to make a bigger name for itself in the nascent 'Net mail market.

The software, called Pronto Lite, will offer basic E-mail capabilities, plus an address book and five folders for mail storage. Users who crave more advanced features, such as spell checking

See CommTouch, *page 40*

Chip maker models new data warehouse

By John Cox
Santa Clara, Calif.

By acquiring a set of third-party data models, semiconductor manufacturer Integrated Device Technology, Inc. (IDT) has managed to launch its first data warehouse pilot in a few months instead of years.

Models are an invisible part of every application; they form the map from which an actual database is built. These data models are the result of a larger, more general business model, which describes how a company does business by defining areas such as customers, orders and invoices. The problem today is that separate applications and databases have separate models and the models are inconsistent.

For IDT, purchasing prebuilt models creates a consistent data structure that will let the firm unify its view of information residing in separate networked databases, said Mike Thompson, the company's MIS manager.

IDT is creating two small data warehouses, or datamarts, with the models. It is running them on Informix Software, Inc.'s OnLine Dynamic Server database and Unix multiprocessor computers from Silicon Graphics, Inc. IDT is evaluating other desktop analysis tools.

The first datamart provides information for sales forecasts. Analysts will use multidimensional analysis and reporting tools to query the database instead of sifting through hundreds of pages of hard copy and computerized data.

The second project is a manufacturing datamart that will give analysts a repository that summarizes manufacturing data from the previous day.

While researching data warehouses earlier this year, Thompson found that creating an overall business model was critical but time-consuming. As a result, he approached Applied Data Resources Management, Inc., a Mill Valley, Calif., company that has spent six years building enterprise business models for a range of industries.

Applied Data built the models with the Silverrun tool set from Computer Systems Advisors, Inc. in Woodcliff Lake, N.J. Among other features, Silverrun supports large format graphics so the completed models can be printed out on wide paper, essential for visualizing how the model really works, said Larry Heinrich, president of Applied Data.

"We put a picture [of the Applied Data model] up on the walls for our end users and told them, 'This is how we think your part of the business works. How close to reality is this?' " Thompson said. The result, he said, was an agreement from the departments on a common view of the business and relevant data. ■

Read:
- A data administrator's detailed guide to enterprise data modeling (from politics to specific modeling considerations)
- A data warehousing primer

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- ▼ May lack flexibility in common data structure to incorporate different business unit needs
- ▼ Requires training effort and management commitment in redirecting all development activities to focus on models

Documentum hopes to have the RightSite stuff

By Barb Cole
Pleasanton, Calif.

A company that made its name managing documents on corporate networks is looking to bring some order to the untidy contents of Web servers.

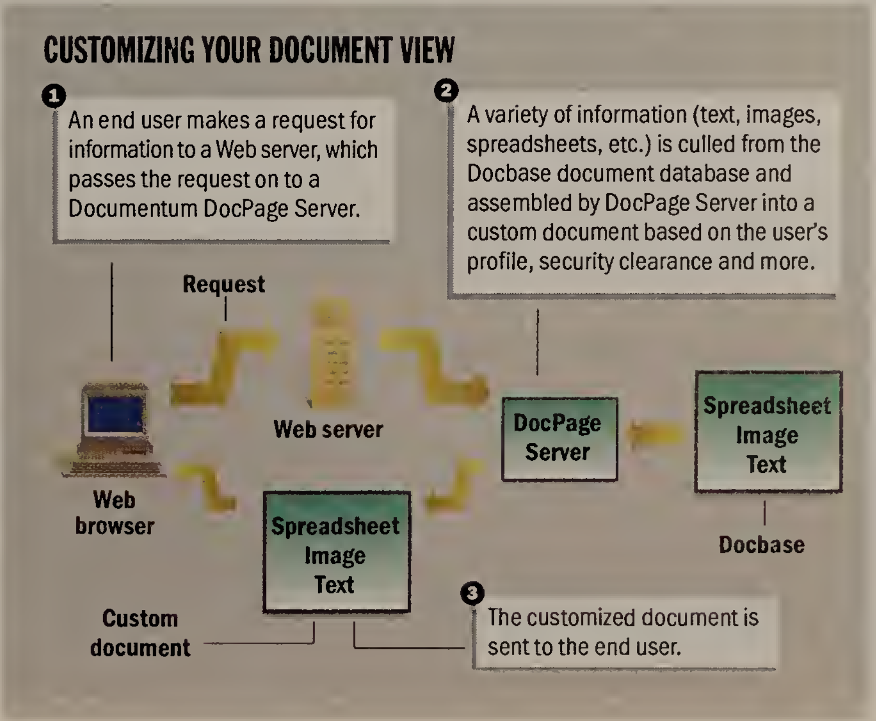
Documentum, Inc. this week will announce RightSite, a software suite that manages documents stored on Web servers and delivers custom pages to end users via standard browsers.

Today, Web server content is typically managed by custom programs that track versions of documents and apply security rules. Still, end users surfing the Web and corporate intranets frequently retrieve too much outdated information.

Because it relies on the company's flagship document management system, the RightSite suite offers version control, security and the ability to handle documents made up of text, numeric and graphical data. But the suite goes beyond simply giving end users Web-based access to a document management system.

RightSite assembles Web pages on the fly, allowing companies to tailor frequently changing Web content to users' needs. Using predefined business rules, the software can filter and assemble information based on a user's preference and security clearance. RightSite also preserves hyperlinks associated with cor-

See RightSite, *page 40*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❶ An end user makes a request for information to a Web server, which passes the request on to a Documentum DocPage Server.

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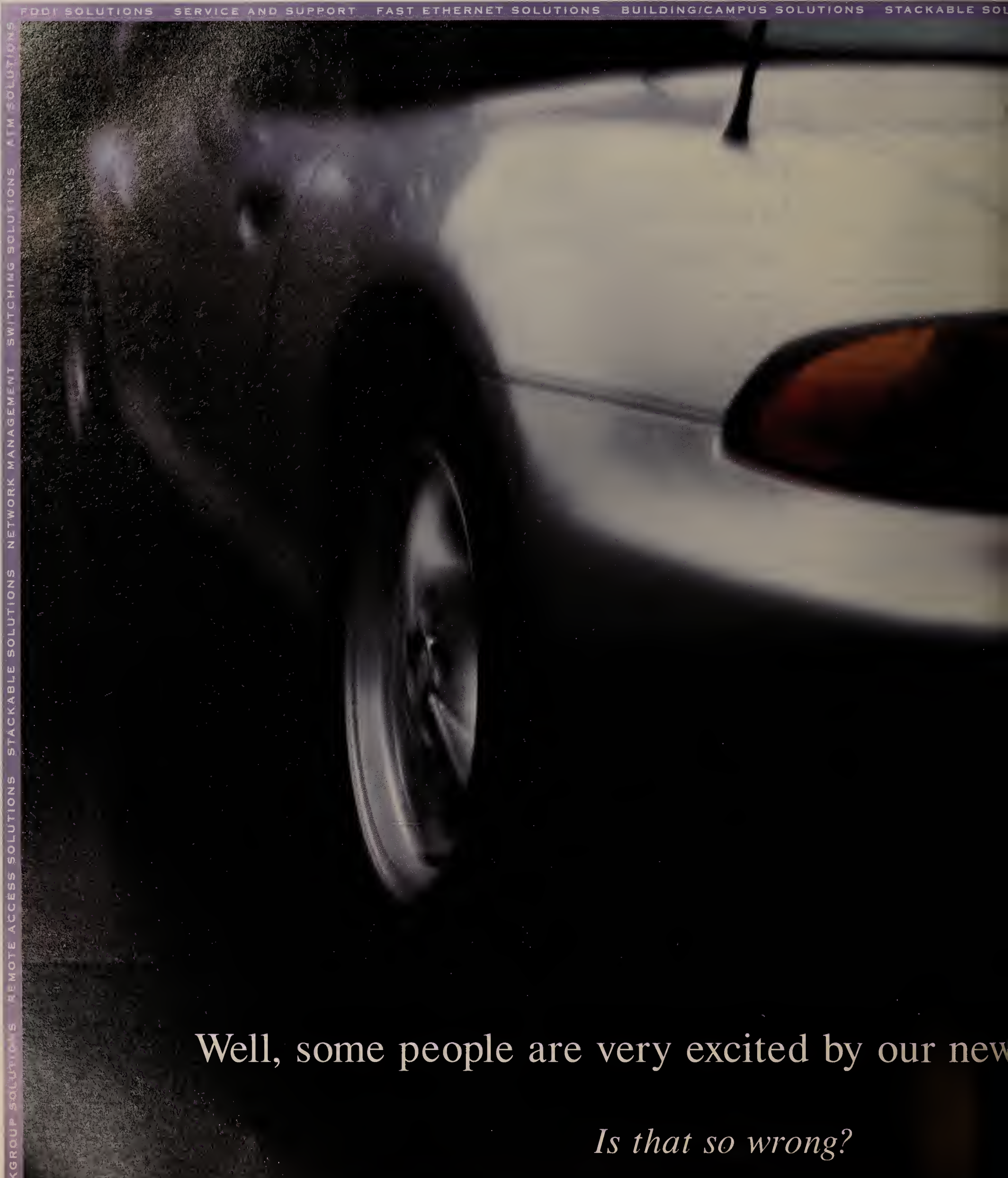
❸ The customized document is sent to the end user.



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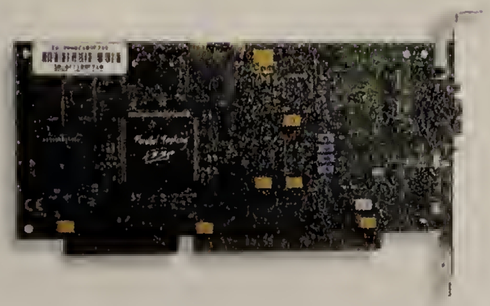

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NETWORKS THAT GO THE DISTANCE

PeerLogic wins distributed object patent

By John Cox
San Francisco

PeerLogic, Inc. has received a U.S. patent for technology that automatically discovers where objects are located on the network.

The technology is a key part of the company's Pipes Platform, a message-oriented middleware product that links parts of an application running on different networked computers. The patent highlights an issue that may become ever more urgent as the Internet becomes an essential part of most corporate computing strategies.

"We set out to solve a problem that we felt was going to be really critical at some point in the future," said Peter Tate, vice president of marketing for PeerLogic. "As you deploy distributed applications on a wider scale, there are lots of pieces. How do you find these, and find them quickly?"

PeerLogic's solution is to run the Pipes kernel program on every computer. The kernels announce themselves to the Pipes network, and a set of algorithms guide the kernels in seeking out other kernels, which together form a logical hierarchy of relationships. By contrast, other distributed computing solutions require the creation of a static, central table or database that lists all the known nodes and their addresses. The algorithms construct a dynamic name service without having to know any addresses in advance.

"As you deploy componentized applications, messaging moves from connecting small numbers of users to thousands, with hundreds of different processing sites," Tate said. "Table-driven solutions won't work."

"That's a description of the Internet," said John Rymer, vice president of Giga Information Group, a Cambridge, Mass., technology research firm. "It becomes more expensive and impractical to centrally control that kind of environment."

Almost no other vendor has tackled the problem in quite the same way as PeerLogic, and Pipes has been proven in some big installations, according to Rymer. But he also pointed out that PeerLogic does not offer as complete a product solution as some vendors.

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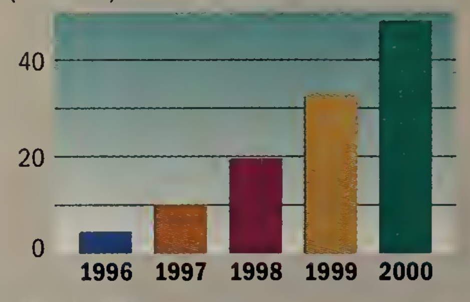
CommTouch

Continued from page 37

and the ability to attach voice messages to mail, can upgrade to the company's Pronto Mail for $39.

WORLDWIDE INTERNET E-MAIL MARKET

The number of installed Internet mailboxes is expected to skyrocket by the year 2000.



SOURCE: IDC, FRAMINGHAM, MASS.

In addition to the free software, the company will announce this week at the E-Mail World conference here two new versions of Pronto that support various Internet standards.

Analysts said CommTouch's software is well regarded and that the company is moving aggressively to get its products in more customers' hands.

"They need to leverage that impressive technology in products that will reach users," said Mark Levitt, an analyst at International Data Corp. in Framingham, Mass.

The new versions of Pronto are aimed at enticing users with leading-edge Internet messaging features. They include an edition of Pronto Mail that supports the advanced 'Net messaging standard Internet Message Access Protocol 4 (IMAP4), and a version that runs as a stand-alone mail client or Java applet.

Pronto IMAP Mail 4.0 exploits the capabilities of IMAP servers, including the ability to store mail folders on a local PC or a host.

Users may also create links between local folders and host folders that are synchronized when the user reconnects to the Internet.

The IMAP-compliant version is also flexible in the way it lets users view and download mail. Users may define multiple locations — such as the airport, a hotel and the office — and apply different download filters to get only the mail they want at that location.

The other new version, dubbed Pronto Java, is an IMAP4-compliant, lightweight mail client for any Java-enabled device, including network computers and personal digital assistants.

The free version of Pronto is available now on the company's Web site (www.commtouch.com). Pronto IMAP Mail 4.0 and Pronto Java will cost $79 and $49, respectively. They will ship in December.

©CommTouch: (800) 638-6824.

RightSite

Continued from page 37

porate Web applications.

In addition to the core document management system, which includes Docbase for storing documents, RightSite features three other components.

The server-based DocPage Server manages document versioning, the maintenance of virtual links between documents and the assembly of custom Web pages. Two other client-based components, Documentum Spider and DocPage Builder, are used to move information from Web sites to RightSite and to build Web applications, respectively.

Analysts said the RightSite suite is a natural extension of Documentum's flagship product.

"Companies don't want to set up five Web servers to handle five different intranet applications," said Carl Frappaolo, executive vice president of Delphi Consulting, Inc., a Boston-based market research firm and consultancy.

RightSite will enable companies to set up one Web server with an assortment of data that can be accessed by a variety of users, he said.

RightSite will ship in the fourth quarter for Netscape Communications Corp. and Microsoft Corp. Web servers running on Windows NT.

Support for Unix-based Web servers is planned for early 1997.

Documentum has two pricing schemes: An unlimited user version for use with Internet applications costs $20,000 per server; a second aimed at intranet applications ranges from $180 to $960 per user.

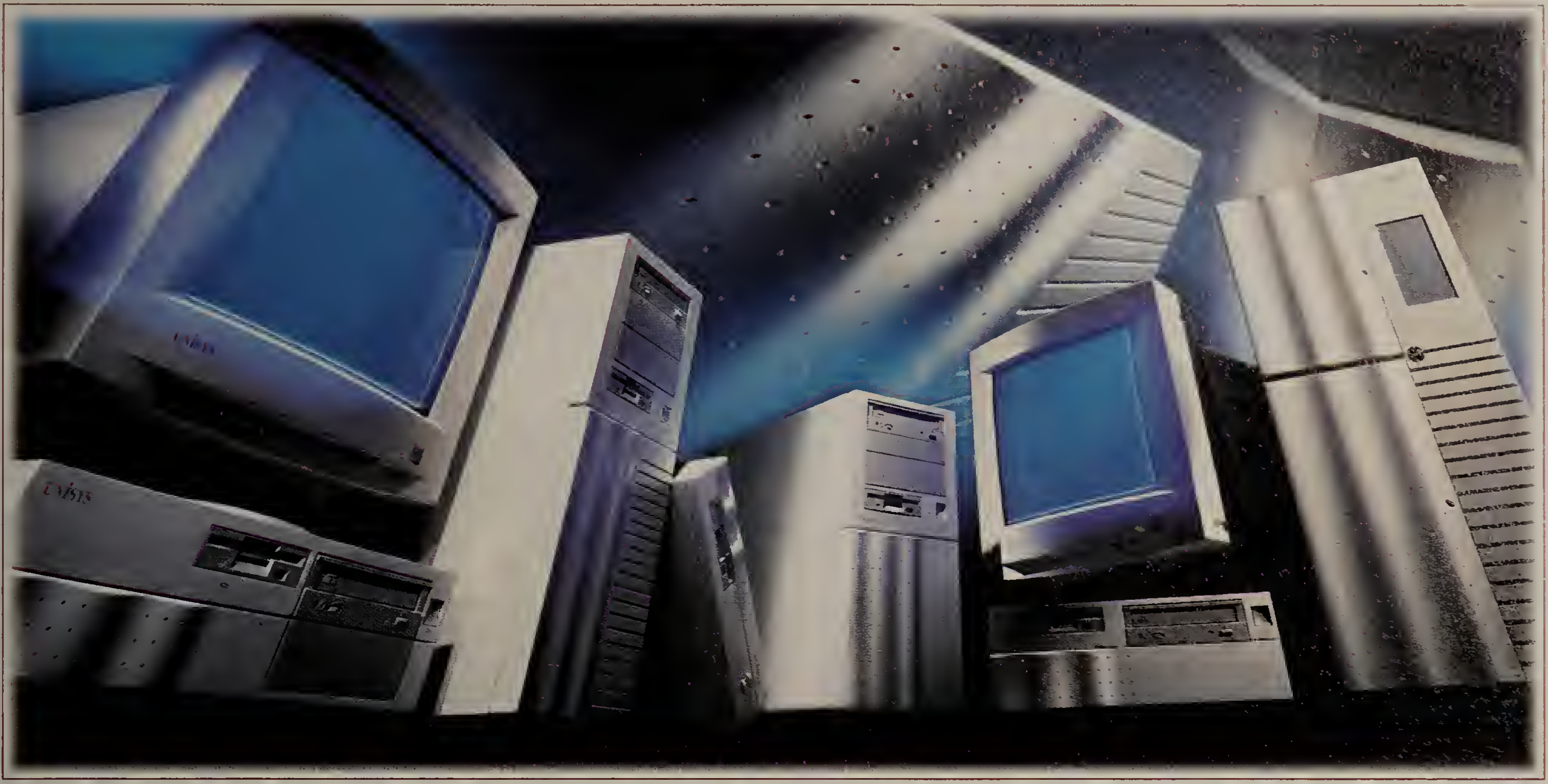
©Documentum: (510) 463-6800.

BusinessBriefs

Nat Systems International, Inc. of McLean, Va., has named **Daniel Eilers** as president and chief executive officer, as well as given him a seat on the board of directors. Eilers was formerly senior vice president of worldwide marketing and customer solutions at **Apple Computer, Inc.** He replaces **John Burton,** who remains on the board. Nat Systems sells the NatStar enterprise application development tool set.

Oracle Corp. announced it will acquire **Datalogix,** a provider of client/server software solutions for process manufacturing. The cash merger is valued at $94 million. Oracle currently owns 13.4% of Datalogix's outstanding shares. Datalogix's applications include the Global Enterprise Manufacturing Management Systems. The deal is subject to shareholder and regulatory approval.

Hyperion Software has selected **William Hewitt** as vice president of marketing. He will report to Hyperion President Peter DiGiammarino. Hewitt was formerly at IBM, where he was program director for IBM's ISSC consulting arm. Hyperion is a vendor of client/server financial software applications.



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SHARED LOGIC

Can Novell make messaging market a three-horse race?

With its recent GroupWise launch event, Novell, Inc. hopes to change the perception of there being just a two-horse race between Lotus Development Corp. and Microsoft Corp. for E-mail and groupware supremacy.

Even before the GroupWise 5.0 launch, GroupWise 4.1 had at least been holding its relative position in terms of ongoing shipments. Recently released International Data Corp. numbers show GroupWise selling 795,000 seats in the first half of 1996 to Notes' 1.61 million. GroupWise actually outsold Microsoft Mail and Exchange.

Given that the GroupWise 5.0 client/server messaging offering shipped later than Notes Release 4 and Exchange, why the continued strong performance of GroupWise 4.1?

Stewart Nelson, vice president and general manager for Novell's Groupware Division, likens the E-mail and groupware market to a highway. "In the fast lane, you have Lotus Notes with complex groupware functionality enabling users to develop applications," he says. "In the slow lane, you have basic E-mail products such as cc:Mail and Microsoft Mail. GroupWise occupies the center lane with out-of-the box E-mail, calendaring and scheduling, document management and task management."

Nelson's analogy is useful. While Lotus continues evolving the high-end capabilities of Notes, both basic Notes Mail and cc:Mail are vectoring toward the center lane of integrated E-mail and basic groupware. So is Exchange. But GroupWise was there first.

Daniel Blum

So in projecting outward about GroupWise, one needs to look at the strategic issues as well as the numbers.

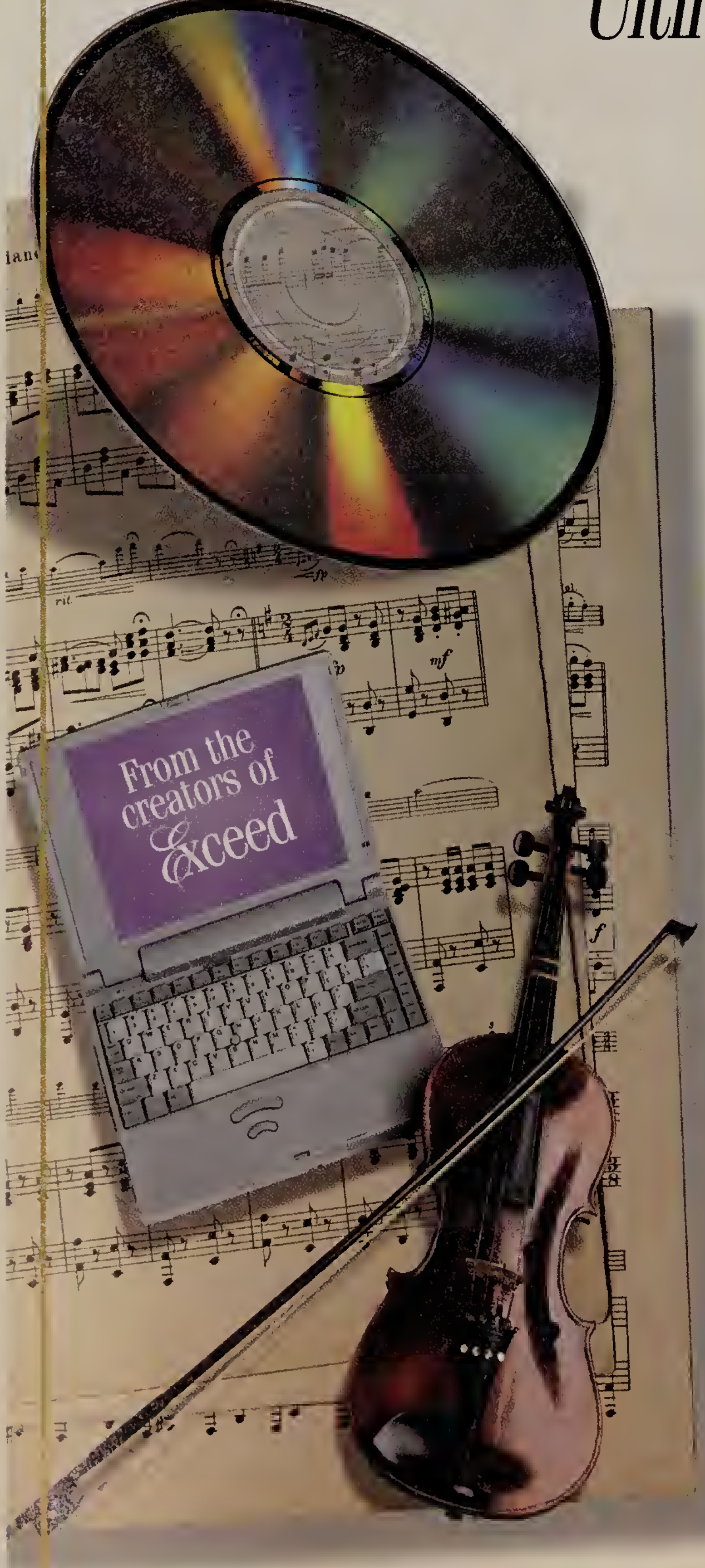
Three major considerations will determine whether Version 5.0 fades or flourishes.

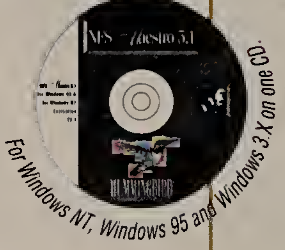
First, how well will GroupWise 5.0 play to the large enterprise? Unlike small-to-midsize users, large ones care very much about the difference between a scalable client/server messaging infrastructure vs. a cumbersome file-sharing one. While client/server messaging competitors Hewlett-Packard Co., Lotus and Microsoft can claim manageable server capacities in the 2,000 mailbox-per-server range, Novell has yet to produce benchmarks for GroupWise 5.0.

Second, how smoothly will GroupWise surf the wave of messaging and groupware's transition to standards-based Internet/intranet protocols? With Web access to the GroupWise features today, and Post Office Protocol 3, Internet Message Access Protocol 4 and Lightweight Directory Access Protocol support planned for release in the first quarter of 1997, GroupWise is slightly behind Notes and Exchange.

The third and final critical success factor for GroupWise is how well Novell engages in the multilevel marketing contest that absorbs today's top messaging vendors. Novell must market to potential development partners and independent software vendors as well as customers.

Blum is a principal at Rapport Communication, a consultancy that focuses on messaging, groupware and electronic commerce. He can be reached at dblum@interramp.com.





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Intranets & the 'Net

Covering: Internet Technologies and Services for Collaboration and Electronic Commerce

Briefs

■ **The World Wide Web Consortium** *has endorsed the Portable Network Graphics (PNG) specification as an open standard. PNG works by providing information in each file about the characteristics of the authoring platform so viewing software can automatically compensate and* **display the image correctly.**

■ **CyberCash, Inc.** *has launched an* **electronic coin service** *called CyberCoin that lets purchasers using the CyberCash Internet Wallet buy goods and services valued at 25 cents to $10, an amount for which a charge card is seldom used. First Union Bank, First USA Paymentech, First Data Corp. and Michigan National Bank said they will pilot CyberCoin services before year-end.*

Separately, CyberCash last week **licensed the CyberCoin technology to Netscape Communications Corp.,** *which will include it in products such as the Netscape LivePayment server.*

■ **The Association of American Publishers** *has selected the Reed Elsevier, Inc. division of R.R. Bowker and the Corporation for National Research Initiatives to develop a Digital Object Identifier that would give customers* **purchasing information off the Internet** *a way to identify the publisher.*

■ *The Reader's Digest Association, Inc., which publishes* Reader's Digest, *is moving onto the World-Wide Web Oct. 28. The Web site will include an online version of its magazine, a* **shopping service** *and what the company says is a consumer-oriented search service called LookSmart.*

■ **RSA Data Security, Inc.** *has started shipping BCERT 1.0, a $290 tool kit for building* **X.509 certificate** *management applications.*

RSA Data Security: (415) 326-9648.

Problems with Java CORBA interoperability looming

By Ellen Messmer and Carol Sliwa

Some of the biggest names in computing are banking on the Object Management Group's (OMG) Common Object Request Broker Architecture (CORBA) to help customers distribute Java-based applications over the Internet.

IBM, Netscape Communications Corp., Oracle Corp. and Sun Microsystems, Inc. are among the companies talking up CORBA and its key communications component — Internet Inter-ORB Protocol (IIOP) — as though their solution soon will be ready for prime time. But the reality is that it may not be all that far ahead of rival Microsoft Corp.'s distributed application scheme, which involves a new open version of ActiveX/Distributed Component Object Model.

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With one key mapping standard not due for resolution until next year, the CORBA camp's customers may find that their system will not work as smoothly as they might have hoped for quite some time.

Customers want to be able to mix Java objects with different vendors' ORBs. If they can do that, for instance, they can develop ways for IIOP-compliant objects to access legacy databases and exchange information across intranets and the 'Net.

But right now, anyone who wants to use CORBA-compliant ORBs from different vendors has to write a unique version of the Java applet for each one. That's because there is no standard for mapping CORBA's descriptive language, called the Interface Definition Language (IDL), to the Java programming language.

That IDL-to-Java mapping standard is what the OMG will be accepting proposals for during the coming months. Letters of intent must be filed this week, with actual proposals due in December.

All three companies that currently sell Java ORB products — Sun, Iona, Inc. and Visigenic Software, Inc. — are expected to pitch their version as the standard.

Whole lot of sniping

Already, there is some sniping going on. Oracle, which like IBM is licensing the Joe source code, is not exactly enthusiastic about Netscape's decision to go with a lesser known company's offering. Netscape has thrown its support — and some money — behind Visigenic's VisiBroker rather than wait around for Sun's Joe to be ready.

"We don't think Netscape will survive another two years," said Mark Jarvis, Oracle's vice president of server marketing, as he outlined Oracle's distributed object strategy. He called the IDL-to-Java mapping a point of friction, accusing Netscape of failing to form the business alliances necessary for its future health.

Sun's Brian Croll, marketing director for the Solaris operating system, further questioned whether the industry would support a small company like Visigenic as a supplier of such key software.

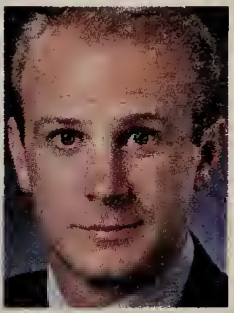
But Eckart Walther, Netscape product marketing manager, said his company is anxious to work out a compromise on the IDL-to-Java mapping standard. Netscape and Visigenic have been talking to Sun in an attempt to resolve the issue, he said.

"The last thing we want to do is split the market," Walther insisted.

He also said that Netscape hopes to cosubmit a proposal to OMG with Sun and Visigenic.

When a standard finally emerges, there will be some work ahead for software developers. CORBA vendors are likely to launch new IDL-to-Java compiler products that comply with the standard. And that could mean developers will have to rewrite or recompile code they have already created.

"Software developers would have to change some aspects of their calls and the way the data types are handled," said Geoff Lewis, manager of business alliances at SunSoft, Inc.'s object products group.



Croll says, *"The industry has coalesced around the Joe mapping."*

With no standard in place at present but one looming in the future, corporate users are forced "to make a business judgment about how much code they write now," said Mark Roy, an analyst for Semaphore Corp., a North Andover, Mass.-based consulting firm. The reality is that they may have to rewrite some code down the road, he said.

If the application is intended for use only on the corporate intranet, the user can stick with one IDL-to-Java compiler and not encounter any significant problem. But if the applets are meant to be shared over the Internet or between different companies, they may have a problem getting objects to work with different ORBs.

Because Netscape is dominant in the Web browser market, many companies may want to ensure that their applets will run with Netscape's ORB run-time compiler, Roy pointed out. ■

CORBA glossary

- **Object Management Group (OMG, founded 1989):** Over 600 members, both vendors and users, whose mission is "establishing industry guidelines and object management specifications to provide a common framework for distributed application development."
- **Objects:** A reusable packet that contains related data (called variables) and procedures (called methods) that can operate on the data.
- **Object request broker (ORB):** Acts as a middleman, connecting objects that request services or functions with objects that can satisfy the requests. Application programmers do not have to know locations of remote objects.
- **Common Object Request Broker Architecture (CORBA):** A standardized blueprint worked out by the OMG defining how application objects and ORBs can cooperate to deliver services or perform processes independent of platform, network or location.
- **Object interface:** Defines an object's boundaries and all the operations you can perform on that object.
- **Interface Definition Language (IDL):** A descriptive language that is independent of any programming language, the IDL defines object interfaces. That is, it lets an object reveal to potential clients what operations it can do.
- **IDL compiler:** A program that translates IDL into a programming language, such as Java or C++, by following the rules defined in the IDL mapping for that programming language.
- **Language mappings:** Rules that specify how IDL is translated into a programming language. IDL compilers generate code conforming to a specific mapping. CORBA 2.0 includes IDL language mappings for C, C++, Smalltalk and ADA'95.
- **IDL stubs:** Generated by an IDL compiler, these bits of code are the means by which clients invoke services on the objects. The IDL stubs free the application from vendor-specific dependencies in an ORB product.

'NET INSIDER

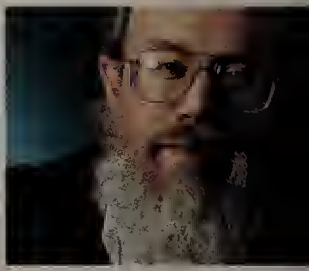
Internet health report, a second opinion

A few weeks ago, *Network World* ran a two-part story concluding that the Internet is not ready for prime time. It's time for a second opinion.

Aside from some amusing terminology glitches (CIDR is Classless Interdomain Routing, not Complex Interdomain Routing — even if the implications of CIDR can sometimes be complex), the articles presented generally accurate information but were a bit tabloidy in interpretation. The tone of the articles and accompanying graphics implied that only a fool would consider using the 'Net for anything important. This seems somewhat out of line with results of the *NW* survey reported in the same articles in which 88% of the readers reported they were satisfied to extremely satisfied with the reliability of the 'Net, and only 10.5% said they were not satisfied or not very satisfied.

The most basic problem with these articles, as with many other commentaries on the Internet, is they treat the 'Net as a monolith. If a user of your Web site is getting lousy performance then the Internet must be at fault even if the real problem is that the user is on a 2,400-baud dial-up.

The specific requirements of a particular Internet user must be understood before deciding that the 'Net is worthless. If you wish to reach one of your own branch offices and your company has contracted with a single top-of-the-line ISP for connections to all branches, you are likely to be quite happy with the result. You could follow the inexpensive alternative and try to support a 50-person office over a 28.8K bit/sec dial-up, but do not blame the ISP or the 'Net for your resulting performance problems.



Scott Bradner

On the other hand, if you have venture capital money to set up an Internet-based phone company and expect to be able to reliably reach customers across multiple ISPs and through multiple exchange points to the ends of the earth, take the money and run, because it's not going to work.

Most organizations that want to use the Internet for business fall between these two extremes. Today, a connection to one of the major ISPs will get you quite reliable service to customers of that ISP as well as customers of many of the other major ISPs. These top-line providers are growing high-speed direct inter-ISP connections to off-load traffic from the normal exchange points. In many cases, the only sustained performance problems users will see are related to the speed of their own tail circuit as well as the tail circuit speed and load of the services they wish to use.

Clearly, you can find the kind of problems mentioned in the articles if you work at it. For example, buy your service from an ISP whose source of clues is a set of Cliffs Notes and get a link that supports about 10% of your need. I guess 88% of the survey respondents did not try hard enough to purchase bad Internet service.

Disclaimer: Although abundantly supplied with opinionated pundits like me, Harvard University itself does not second-guess the diagnosis of others.

Bradner is a consultant with Harvard University's Office of Information Technology. He can be reached via the Internet at sob@harvard.edu.

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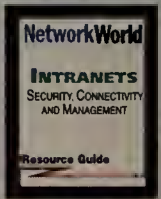

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Technology Update

Keeping Up with Network Technologies and Standards

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I'm doing a full restore from my primary to my backup server. What files — autoexec.ncf, startup.ncf, etc. — do I not want to overwrite on my backup server?

Via the Internet

You don't want to restore the autoexec.ncf file, or the backup server will end up with the same name as the primary server. It also could cause routing problems on your network as you would have two servers with the same internal IPX network number. This number is used by Novell, Inc. NetWare servers to know how to route traffic between multiple network cards in the same server.

You also should avoid restoring the system, public and etc. directories. To save time during the restore process and keep the servers unique. This is important when the primary and secondary servers run different NetWare versions.

Since the startup.ncf file is kept on the server's DOS boot partition, this file cannot be restored or backed up from server- or workstation-based tape backup solutions.

Restoral of the trustee directory rights depends on whether users will need to log on to the server. If they don't need to, restoring just the data will save time during the restore cycle. If the backup server is expected to provide network services while the primary server is offline, then restore the trustee directory rights and the logon script.

Cheyenne Software, Inc.'s Arcserve backup solution can help minimize time spent restoring a backup tape. It offers a server-to-server copy function that can intermittently copy only those files that have changed. This gives you the option of quickly changing from a primary to a backup server with minimal loss of data, depending on how long it has been since the last server copy cycle.

If no loss of data or network downtime is acceptable, consider implementing Novell, Inc.'s System Fault Tolerant III version of NetWare 4.1.

Internet, intranet computing brings in new wave of messaging standards

By Eugene Lee

For the past 10 years, companies have been bombarded by APIs, messaging middleware and messaging server access protocols meant to help them link disparate E-mail clients and applications. There is Apple Computer, Inc.'s Open Collaboration Environment, Common Messaging Calls, various flavors of Microsoft Corp.'s Messaging API and Vendor Independent Messaging (VIM), to name a few.

Just when they have finally figured out what all these mean and how they compare, a wave of Internet and intranet computing rolls in, bringing with it even more messaging standards. These standards finally deliver on the promise of openness and multivendor compatibility.

The most significant new messaging standards are the Simple Mail Transfer Protocol, Multipurpose Internet Mail Extensions (MIME), Post Office Protocol (POP), Internet Messaging Access Protocol (IMAP), Lightweight Directory Access Protocol (LDAP) and Secure MIME (S/MIME). Here's an overview of these messaging standards.

Basic message transport

SMTP (IETF RFC 821 and RFC 822) is the standard for exchanging messages across the Internet and intranets. The protocol, which originated as a way to transfer text messages in Unix environments, runs on TCP/IP networks.

The protocol employs the name@company.com addressing format now found on most people's business cards. This format represents the best way for people outside a company to reach a contact inside a company. Even though companies may still use proprietary LAN E-mail systems, most have installed SMTP gateways, so employees can send and receive E-mail beyond the scope of the corporate LAN or WAN.

SMTP is viewed as an alternative (for example, it's simpler and less expensive) to the X.400 standard for linking different organizations and their potentially disparate E-mail packages. SMTP will be enhanced with additional security and reliability features, and it will become more closely connected to X.400 communications.

The MIME protocol, found in IETF RFC 1521, was developed to enable mixed-media messages to be transmitted across TCP/IP networks. It allows audio, binary and visual data to be included as part of a mail message. With MIME, you can create and read E-mail messages that include rich text formatting, such as different fonts, scanned images, spreadsheets and sound.

INTERNET MAIL STANDARDS AT A GLANCE

Standard	IETF designation	Description
SMTP	RFC 821 and 822	Dominant E-mail messaging protocol for use on TCP/IP networks
MIME	RFC 1521	SMTP extension that allows audio, binary and visual data to be included as part of a mail message
POP	RFC 1725 (POP3)	Internet mail server protocol that provides basic message transfer capabilities using SMTP
IMAP	RFC 1730 (IMAP4)	Next-generation Internet mail server protocol that provides more robust messaging
LDAP	RFC 1777	Directory standard for Internet applications, including messaging
S/MIME	Not applicable	De facto standard for securing Internet mail messages

Before MIME became widely used, nontextual information within a message typically needed to be encoded in a proprietary format. If the message was transported across a gateway, all nontextual information usually disappeared or became garbled. Messages that use MIME retain nontextual information and display it for the recipient.

On the server

POP is an Internet mail server protocol that provides message transfer to clients using SMTP. Defined in 1984, POP is the oldest and best known Internet client/server messaging protocol (the current version is called POP3, as discussed in RFC 1725). POP offers similar capabilities as proprietary LAN-based E-mail server software but in an open manner.

IMAP extends messaging one step further. Regarded as the next-generation Internet mail server protocol, IMAP provides store-and-forward capabilities that allow users to access their inboxes on the server from any workstation as if issuing remote procedure calls. Dubbed the Interactive Mail Access Protocol when it was first created in 1986, the protocol's name was changed in 1993 to better reflect its capabilities.

The latest version, IMAP4 (RFC 1730), offers easier mail administration than its predecessors and the ability to create and manage folders over WANs. Many experts see IMAP replacing POP as a more robust, scalable and manageable messaging protocol.

If Internet messaging is to become a credible alternative to LAN-based E-mail, a directory service that provides reliability, scalability, security and manageability is needed. LDAP (RFC 1777) meets these requirements. It has been embraced by leading 'Net vendors for use in their applications, including messaging.

A user who has an LDAP-compliant E-mail client will be able to browse the directories of any LDAP-compliant directory — not just the messaging server the E-mail client uses.

The S/MIME security standard also has received broad vendor support. It is increasingly being used instead of the Pretty Good Privacy and Privacy Enhanced Mail techniques for securing all types of mail messages.

While most of these are official IETF standards, others, such as S/MIME, are emerging as de facto standards.

Users get plug-and-play compatibility across different vendors' solutions, multiplatform support and investment protection of existing TCP/IP networks.

Today, leading LAN E-mail vendors are adding Internet messaging capabilities to their proprietary products, and some new vendors are focusing exclusively on Internet standards. Other Internet mail offerings, such as the Eudora and Pegasus freeware packages, also support multiple standards.

In the coming months, as more organizations migrate to standards-based mail for full-blown intranet messaging, Internet-based E-mail offerings will proliferate. Users will also see more messaging-related APIs and protocols in their environments as Internet and proprietary E-mail systems coexist.

Evaluate competing offerings closely. While many promise Internet compatibility, it's important to understand the difference between true native Internet messaging and integration via mail gateways.

The most solid approach will meld all of the relevant standards with feature-rich functionality. For the first time, desktop and mobile users will be able to leverage the Internet while retaining the E-mail features — from spell-checking to advanced filtering and even rules-based workflow — they've come to expect.

Lee is vice president of marketing & business development at Coordinate.com, the Waltham, Mass.-based Internet division of Banyan Systems, Inc. He can be reached at elee@coordinate.com.

For more information on LDAP, see next week's Technology Update.

NOW WE HAVE A WAY TO
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Has It Changed Your Life Yet?

EDITORIAL INSIGHTS

The past as prologue

Here's a history lesson that may be enlightening for anyone seeking solace in Netscape's decision to invite the Justice Department into the Internet battle.

Last week, Microsoft "reintroduced" the Microsoft Network (MSN) as an Internet access service with aggressive, flat-rate pricing that matches or beats deals from major players like AT&T.

You remember MSN, right? A couple of years back, the major online services, including America Online and Prodigy, demanded government protection from Microsoft. They said Microsoft's plan to make MSN only a click away for millions of Windows 95 users would give the newcomer an unfair advantage.

But Justice declined to bite, content with derailing Microsoft's buyout of personal finance software company Intuit — a specious victory. Anyone with even a rudimentary understanding of the industry — myself included — could see the real threat facing online providers was not Microsoft, which was attempting to replicate its closed networks, but the Internet.

Since then, all of the online services have retooled to deal with the 'Net sea change. But despite the Microsoft wake-up call, they haven't moved very quickly or successfully, as AOL's recent financials illustrate. The competitive landscape has also changed dramatically. The online providers have latched onto Microsoft's Internet Explorer browser like leeches, trying to get what they wanted to deny Microsoft — their own icons on Win95. So much for supporting upstart Netscape in the face of its old nemesis.

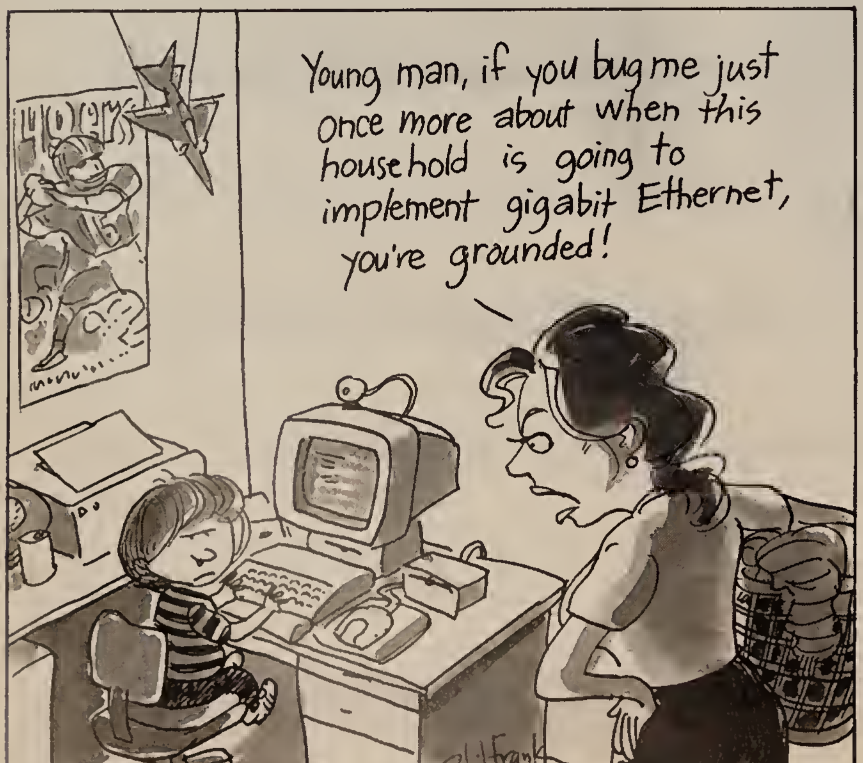
The inexorable workings of the market have provided consumers with new online and Internet access options, and forced providers to lower costs and improve their networks and content. I can't say what would have happened if Justice had gotten involved, but I'll bet the online providers would be better off today if they had spent more of their time worrying about the Internet than a legal fight with Microsoft.

Same for Netscape. It needs every dollar and every ounce of energy focused on the fight to win the intranet — not the browser — battle. No one knows how that market will take shape, but Netscape can't afford to take its eye off the ball right now.

John Gallant, editor in chief jgallant@nww.com

Teletoons

By Phil Frank and Joe Troise
baba@sfgate.com


49ers
Young man, if you bug me just once more about when this household is going to implement gigabit Ethernet, you're grounded!
Phil Frank

THE BLUE VIEW

SNA users must learn to live in a TCP/IP world

A fundamental but insidious paradigm shift has been occurring in mainframe-centric networking over the last few years: The mainframe world has been slowly but surely moving away from SNA and toward TCP/IP and Layer 2 switch-oriented networking.

Anura Gurugé

In a recent survey of 360 IBM mainframe sites worldwide conducted by IBM-watcher Xephon PLC, TCP/IP was cited as the most important standard, with SQL in second place, SNA in third and Advanced Peer-to-Peer Networking way down at 17. This was the first time in the annual survey's seven-year history that SNA was not cited as the No. 1 standard.

This does not mean, however, that SNA is dead. What it does mean is that SNA mission-critical applications are no longer the cornerstone of commercial-sector computing. Unix- and Windows NT-based applications that "speak" TCP/IP are now routinely augmenting — and in some cases, displacing — SNA applications.

Most SNA networks are already laden with devices such as hubs, bridges and LAN switches that are managed using SNMP rather than NetView/390. Internet access, which is all TCP/IP, continues to burgeon, while TCP/IP-centric intranets are the latest vogue in enterprise networking.

The result of all these converging trends is that SNA-specific backbones — the quintessential mainframe networks for the last two decades — are now anachronisms. SNA will end up as yet another class of traffic — albeit a still very important and prevalent one — flowing across TCP/IP-centric networks. Web browser-based access to mainframe and IBM Application System/400 machines-resident SNA applications will be *the* growth trend in the IBM world in 1997.

> *Web browser-based access to mainframe and AS/400-resident SNA applications will be* the *growth trend in the IBM world in 1997.*

The good news is that there are a surfeit of proven, flexible solutions for realizing TCP/IP-based networks that can adroitly accommodate all forms of end-to-end SNA interactions. Moreover, one set of technology permits native SNA/APPN traffic — that is, not encapsulated within TCP/IP — to exist harmoniously alongside TCP/IP traffic, and another enables SNA interactions to occur across a TCP/IP-only backbone.

Consequently, the first key decision you must make when planning for a TCP/IP-based network that still supports SNA is whether to continue to permit native SNA/APPN traffic to traverse the backbone or to require that all traffic be in some form of TCP/IP.

A crucial but often overlooked point is that standardizing on a TCP/IP backbone does not mean you have to eradicate SNA traffic. All major bridge/routers support APPN Network Node routing and dependent LU Requestor functionality to enable traditional SNA to be transported across APPN. As a result, it is indeed possible to build TCP/IP-oriented and managed backbones in which native SNA/APPN and TCP/IP traffic flow side by side.

If frame relay is used for the backbone WAN, RFC 1490 solutions will also enable TCP/IP and native SNA to coexist. And at the campus and workgroup level, supporting SNA and TCP/IP side by side is not an issue because bridges and LAN switches operate at Layer 2 in a protocol-independent manner.

Nonetheless, with many vendors advocating future networking fabrics based on IP switching, and LAN switches offering optional IP routing, many network managers are seriously contemplating IP-only networks in which protocols such as SNA will in some way be subservient to TCP/IP. A huge spectrum of enticing technology, ranging from Data Link Switching (DLSw) to browser-based access to SNA, facilitates this type of TCP/IP-only networking.

The best way to come to terms with all of the available technology is to view the SNA universe as consisting of three distinct classes of equipment: SNA-only devices (for example, old 3x74 control units), PCs and workstations, and devices that can run either SNA or TCP/IP (for example, AS/400).

SNA traffic from SNA-only devices can be accommodated across a TCP/IP-only backbone using DLSw or IBM's AnyNet protocol conversion technology — with the former being the more strategic and ubiquitous. In the case of devices that can speak both SNA and TCP/IP, SNA interactions across a TCP/IP-only backbone usually can be achieved using tn3270 and File Transfer Protocol between the device and a TCP/IP server colocated with the relevant mainframes.

In the case of PCs and workstations, the choice can be bewildering. All of today's major SNA LAN gateways (such as Microsoft SNA Server) support IP between the gateway and PC clients running feature-rich 3270 emulators. And tn3270-based SNA access, especially with channel-attached servers, is becoming increasingly popular given the cost-effectiveness of tn3270 software. Browser-based access, with channel-attached HTML-to-SNA/3270 servers, is likely to be available by year-end and will be all the rage in 1997. Browser-based access will complement tn3270 in the beginning, but in time it will likely surpass tn3270.

It's clear that we in the SNA community must come to terms with living in what will be a TCP/IP-dominated world. The good news is that there is plenty of technology to make this transition as painless as possible.

Gurugé is an independent consultant specializing in internetworking and IBM network architectures. He can be reached at (603) 878-1303 or at aguruge@mcimail.com.

TOTALLY UNPLUGGED

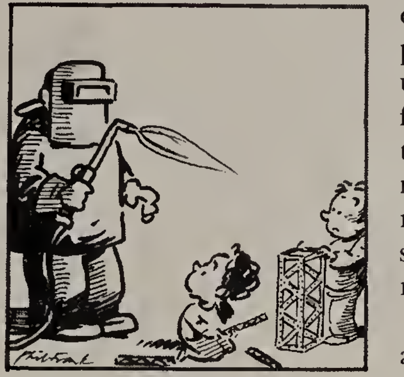
FCC should butt out of technology planning

By Ira Brodsky

Based on the sound bytes emanating from Washington, D.C., you might think the Federal Communications Commission's main goal is to ensure an orderly transition to fully competitive markets — and then step out of the way.

Think again. The FCC is reinventing itself as a technology planning agency. Take the following examples:

- The FCC recently ordered cellular telephone carriers to develop and implement the capability to pinpoint the location of any mobile user who dials 911. Cellular carriers will be required to provide position data accurate to within 125 meters by the year 2001. While this is a desirable feature, it will probably drive up cellular telephone service fees. Is there really a net safety benefit if fewer people are able to afford and operate cellular telephones?



When government meddles in business, it's always with the best of intentions, but things don't always turn out as planned. Compelling cellular operators to track mobile subscribers may prompt users to switch to competing services such as the new personal communications service. Many users won't want to use a service that has the ability to track their every movement, even if carriers promise to employ it only during emergencies.

- This summer, the FCC ruled that specialized mobile radio (SMR) operators must support intercarrier roaming. SMRs provide two-way mobile radio services, primarily for dispatching field service technicians, delivery trucks and taxicabs. Although the vast majority of SMR traffic is local, the FCC has decided that operators should be required to serve visiting users — users who subscribe to SMR services in different cities. But most SMR systems were not designed to support such roaming, and carriers will have to construct a WAN for sharing subscriber authentication and billing information.

Believing that market forces are not always sufficient to ensure delivery of important end-user services, government officials sometimes feel it is up to them to intervene. But has the FCC seriously considered the technical and financial implications in this case? While it is not clear there is significant demand for SMR roaming, requiring it will almost certainly drive small and independent operators out of business. Some industry participants are beginning to wonder if the real purpose of this ruling is to boost the value of SMR licenses in future spectrum auctions.

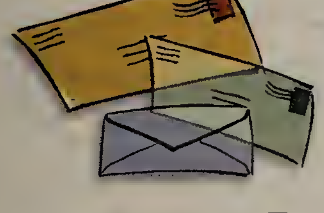
- The recent ruling on local network interconnection demonstrates the FCC's willingness to micromanage the telecommunications industry. While proclaiming an era of deregulation, the FCC has decided that local telephone monopolies must offer no fewer than seven unbundled network elements, providing plenty of fresh work for the public utility commissions. Like the president's Health Security Plan, the interconnection ruling foretells a future in which companies compete by providing government-mandated services within government-mandated price ranges.

But this is not surprising. In a speech to the Interactive Services Association Conference this past July, FCC Chairman Reed Hundt half-jokingly referred to the Telecommunications Act of 1996 as the Bandwidth Act of 1996. While the press has correctly emphasized the legislation's goal — to introduce competition — what Chairman Hundt sees is a laundry list of features and services to be introduced with careful guidance from the FCC.

What is objectionable about government technology planning — besides the fact that government officials often can't tell the difference between a legitimate business decision and an arbitrary ruling — is it doesn't work. Products and services rarely succeed by adhering to a strict plan. The greatest network innovations result from vendors responding to ever-changing user demands and competitive forces. And it is in users' best interest to ensure that vendors continue to enjoy that freedom.

Brodsky is president of Datacomm Research Co., a Wilmette, Ill., consulting firm. He can be reached via the Internet at ibrodsky@ix.netcom.com.

MESSAGE



QUEUE

For the record

Your review of fax server options for Windows NT (Aug. 26, page 49) contained some inaccurate statements regarding Global Village Communication's network server software. It appears your reviewer may have evaluated an earlier version of the software, FaxWorks Pro LAN Windows NT 1.0 (listed incorrectly as Version 3.0 in the article), rather than the more recent FaxWorks Server 2.0 for Windows NT.

We would like to address the following statements from your review:

- "FaxWorks lacks some useful features, such as tools for annotating or marking up faxes." FaxWorks includes tools that allow the user to add text, graphics and other item to any fax document.
- "FaxWorks provides client support for Windows only." To clarify, FaxWorks offers clients for Windows 3.1, Windows 95 and Windows NT.
- "FaxWorks supports only Brooktrout fax devices." In fact, FaxWorks supports Brooktrout, GammaLink and selected Class 1, Class 2 and Class 2.0 modems.
- "FaxWorks supports direct-inward dial and dual-tone multifrequency routing." FaxWorks also supports T.30 subaddressing, Call Station ID routing, line routing and manual routing.
- "There is no management utility to delete faxes based on their age." FaxWorks includes fax management in the workstation software. Faxes can be deleted based on both age and event status.
- "FaxWorks does not provide a quick means of attaching external files to your faxes when sending from the client interface." FaxWorks provides an Attach Pages button on the Send Fax dialog box.
- "FaxWorks supports Lotus Notes and GroupWise but not Message Handling Service (MHS)." In fact, FaxWorks does not support GroupWise at this time, but it does support MHS. GroupWise support will be available in an upcoming release.

We hope this conveys to your readers a more accurate view of FaxWorks.

Kay Stephenson
Product-line manager, LAN/Server Products
Global Village Communication, Inc.
Marietta, Ga.

Editor's response: Global Village released a new version of its fax server software between the time we finished testing and the time the article was published. We stand corrected on the subject of annotation and markup tools as well as the lack of GroupWise support. Our statement about supported fax devices came from the Installation and Administrator's Guide.

Our notation of DID and DTMF support was not meant to imply lack of other routing algorithms. The lack of a management utility for deleting faxes referred to a centralized automated routine for housecleaning, which FaxWorks does not have. The Attach Pages feature is available only after you select the Prior to Send option, which is, according to the FaxWorks ProLAN User's Guide, "only available when printing from a Windows application other than FaxWorks Pro."

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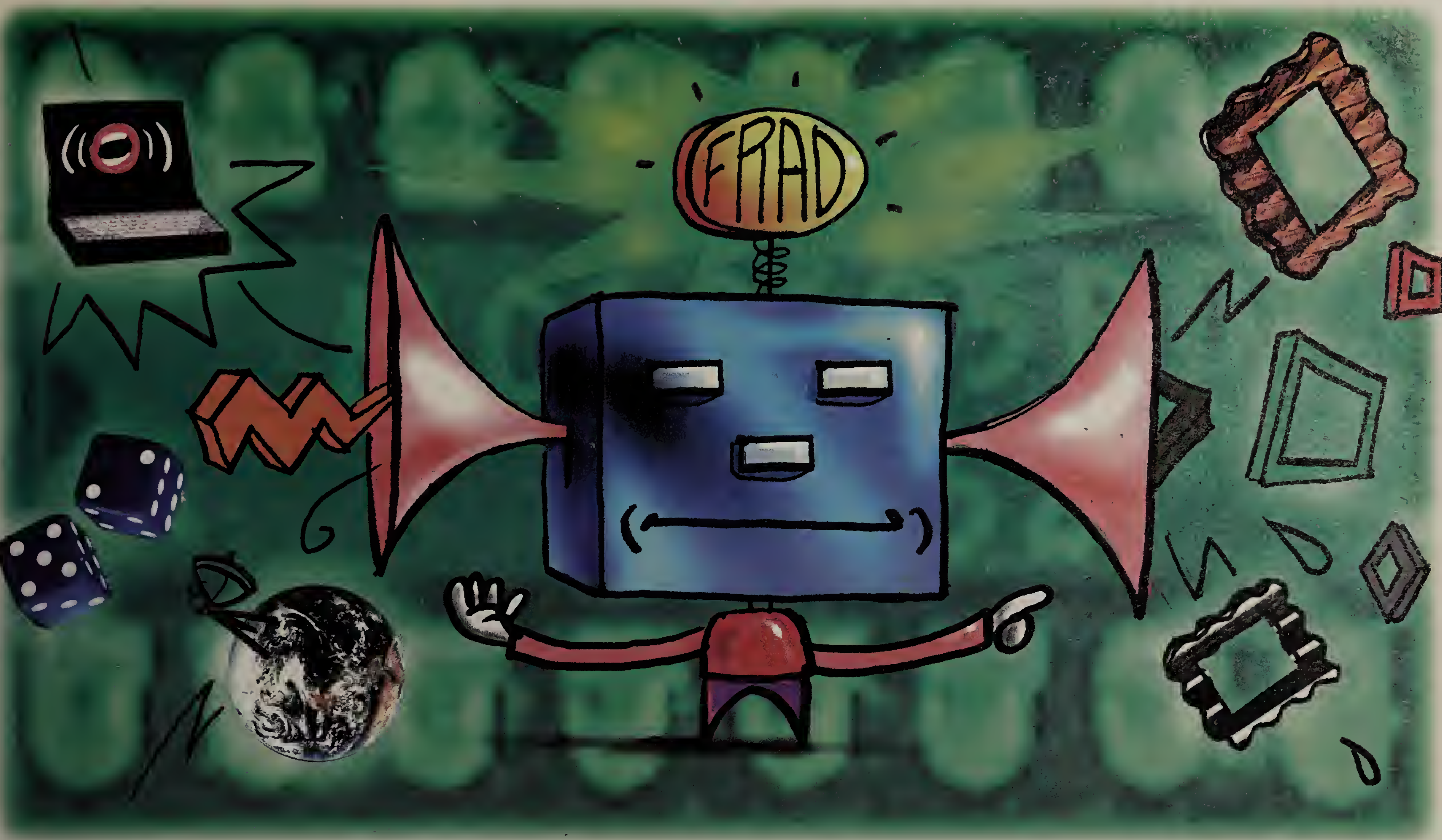


MARCOS SORENSON

Framing it up right

A guide to choosing the frame relay access device that best fits your traffic mix.

By Kevin Tolly and John Curtis

Unlike some technologies whose glory days seem over by the time products hit the street, fascination with frame relay remains at a fever pitch. Frame relay services and devices are being used now in many of the ways still only envisioned for ATM, albeit on a more modest scale.

But to get the most out of these services, you need to have the right frame relay access device (FRAD). In its 1996 Industry Study of FRADs, The Tolly Group is profiling and testing a cross section of products from Advanced Computer Communications, Inc. (ACC), Cisco Systems, Inc., Hypercom Network Systems, IBM, Memotec Data, Inc., Motorola, Inc., Netlink, Inc. and RAD Data Communications, Inc.

Based on this research, we've identified the core criteria you need to consider when making a FRAD buy.

We've organized all the various features and functions into logical groups to simplify the decision-making process. LAN internetworking, legacy WAN support, frame relay specifics and network management are the four groups common to all FRADs. Our fifth group, which is optional, is voice. Here we have a clean split down the middle with four of our eight vendors supporting it.

In this article, we'll identify functions common to all products and highlight key differentiators and industry trends.

LAN INTERNETWORKING

Core internetworking support is solid. IP and IPX routing adapted on the frame relay side to run using RFC 1490 headers is a standard feature on all the boxes we looked at. Most devices even exceed expectations on the IPX side, offering a variety of bandwidth conservation features, including Server Advertisement Protocol caching, Routing Information

CLOCKING THE FRADs

In addition to the criteria outlined in this article, FRAD performance must also be considered. In lightly loaded networks, it is unlikely any FRAD will have difficulty filling the relatively low-speed WAN connections used. But, on the flip side, aggregating LANs and various WAN devices (SDLC, BSC, asynchronous) into a low-speed WAN can easily result in congestion. It is here that performance — in terms of prioritization and congestion control — becomes meaningful. The Tolly Group is in the process of running a battery of tests to reveal how the various devices react in such situations. Results will be reported at a later date.

Protocol spoofing and watchdog timer spoofing.

Although these features are not mandatory on leased lines, they help conserve WAN bandwidth by suppressing superfluous traffic from traversing the frame relay network. Almost every product under consideration supports these functions.

For IP and IPX, product differentiation is limited to support of IP RIP Version 2 and NetWare Link State Protocol for IPX. About half the products support these protocols. A requirement for AppleTalk or DECnet routing will also effectively cut your product list in half.

Bridging the gap

Ironically, it is the more basic area of bridging where the most significant differences can be found. Industry-standard transparent bridging and source route bridging (SRB) — for token ring only — are common features. RAD, however, uses a proprietary bridging approach.

If your SRB needs are any more than basic, you'll need to look more closely at these products. Source routing transparent, the ability to operate in both the transparent and source route modes simultaneously (again, a token-ring-only feature), is supported by fewer than half of the products in this group.

Of particular importance when linking branch Ethernet LANs to a headquarters token ring is the support for some type of bidirectional frame conversion facility for bridged protocols, such as SNA and NETBIOS. Not all products offer this facility. For those that do, there are several approaches.

Most products implement a translational bridging approach. Here, the FRAD reconciles media access control (MAC) layer frame differences between Ethernet and token ring. Additionally, the FRAD terminates token ring's SRB protocol, which is not supported on Ethernet (see graphic, this page).

The more standard and more robust approach is to link disparate topologies via Data Link Switching (DLSw). Here, the Layer 2 protocol is actually terminated rather than translated by the FRAD, allowing a cleaner interface. The data packet is then transported across the WAN in a routed IP packet. DLSw is, in effect, externally imposed routing for Layer 2 (that is, bridged) protocols.

Given that DLSw offers additional robustness and is endorsed by a multivendor consortium, it is a more desirable solution than translational bridging, even though it may impose higher overhead on the WAN.

LEGACY WAN SUPPORT

Early adopters of frame relay were often drawn to it because it could allow legacy Synchronous Data Link Control, Binary Synchronous Communications and asynchronous traffic to be logically multiplexed over a single physical link that could also carry LAN traffic.

Previously, these older protocols typically traveled over a physical network separate from that used for LAN internetworking. Or if they used the same physical network, multiplexers were employed to carve out dedicated chunks of bandwidth for each legacy WAN connection.

Either way, bandwidth efficiency was low because bandwidth was dedicated and complexity was high because each legacy WAN datastream was handled separately.

Early on, vendors of FRAD products realized that the market for legacy WAN protocols was significant. The options offered have multiplied over the past few years and are too subtle and varied to be covered in detail here. However, the story can be told quite effectively just by covering the high points.

SDLC's unique options

SDLC is the Layer 2 protocol used to build pre-LAN, single-protocol, SNA networks. It is used by devices such as IBM's venerable 3274 and 3174 cluster controllers, hundreds of thousands of which have been deployed around the world since their introduction in the mid-'70s.

Network managers typically have twin goals when reengineering their SDLC networks: integrate the SDLC WAN and LAN internetworks into a single physical and logical network, and reduce the number of individual SDLC ports required by the front-end processor (FEP). In some cases, the goal is to eliminate host-side SDLC connections.

Integrating SDLC devices into a LAN/WAN frame relay scheme offers some unique options because the protocol stack running above the SDLC layer is pure SNA, meaning it's completely compatible with SNA elements that run over Logical Link Control 2 (LLC2) in the LAN environment. The choice of approach has more to do with the characteristics of each individual network than the intrinsic advantages of one approach over another.

For starters, FRAD vendors all implement SDLC conversion. This is a process by which a FRAD terminates an SDLC connection, internally converts SDLC to LLC2 and places the traffic on the LAN internetwork for transport to the mainframe. At the host site, a LAN-based SNA gateway receives the now-native SNA/LLC2 traffic and delivers it to the mainframe, or AS/400. From the host-site perspective, the SDLC connection no longer exists. Because SDLC ports could now be eliminated from the host-site FEP, significant cost savings could be realized.

Early on, there were significant problems associated with running SNA across LANs. For years, bridge/routers were unable to implement effective prioritization schemes that would prevent critical SNA traffic from being clobbered by less important file server traffic. Thus, many customers were reluctant to embrace SDLC conversion and combine SNA and LAN protocols on the same link.

While prioritization schemes have matured since then in the leased-line world, the virtual circuit and dynamic bandwidth aspects of frame relay now pose a new set of challenges. The jury is still out on how well frame relay prioritization schemes work, although we're working on finding out as part of our FRAD tests.

Frame relay provided the basis for another way for network managers to reduce support costs while maintaining SNA session integrity. In the Network Control Program (NCP) Version 7.1 (NCP is the program that runs in the FEP) IBM introduced a direct frame relay connection for the FEP. This included support for frame relay devices running either IBM's Boundary Access Node (BAN) or Boundary Network Node software.

When used in conjunction with compatible FRADs, that enables SDLC traffic to be sent over frame relay into the FEP. By multiplexing many SDLC devices into the single frame relay FEP interface, you can eliminate potentially huge numbers of SDLC ports from the FEP.

How we did it

The Tolly Group frame relay test network included a pair of frame relay access devices (FRAD) connecting a branch office LAN to a central-site LAN over a frame relay WAN consisting of a Cascade Communications Corp. B-SDTX 9000 frame relay switch.

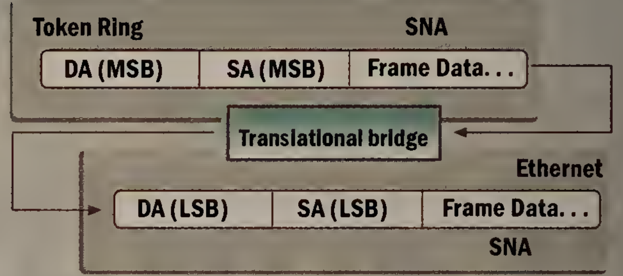
We used two typical speed configurations: 64K to the branch with 256K bit/sec to the central site; and 256K bit/sec to the branch with T-1 to the central site. Vendors were free to choose the LAN topology — either 10M Ethernet or 16M bit/sec token ring. They were also free to specify the circuit configuration on the switch, including both the committed information rate and the excess information rate.

The test suite used several performance measurements, including interactive and batch throughput for both SNA and TCP/IP interactive and batch throughput, prioritization of SNA vs. IP, frame relay congestion response and compression. For the SNA and IP interactive and batch traffic, The Tolly Group used Chariot network testing software from Ganymede Software, Inc.; for these tests, Chariot simulated Advanced Program-to-Program Communications and TCP/IP endstations performing data transfers. Performance results were based upon the transaction times as reported by Chariot.

To test for congestion response, The Tolly Group reconfigured the Cascade switch to simulate a connected pair of frame relay switches connected. The test engineers then congested the switch-to-switch link using a DominoWAN from Wandel & Goltermann Technologies, Inc. and observed changes in the network traffic patterns indicative of the FRADs' response. For voice over frame relay, we measured the impact of voice traffic on the performance of a data connection, and the impact of data-only traffic on the quality of voice. We also measured audio quality and bandwidth utilization during both speech and silence.

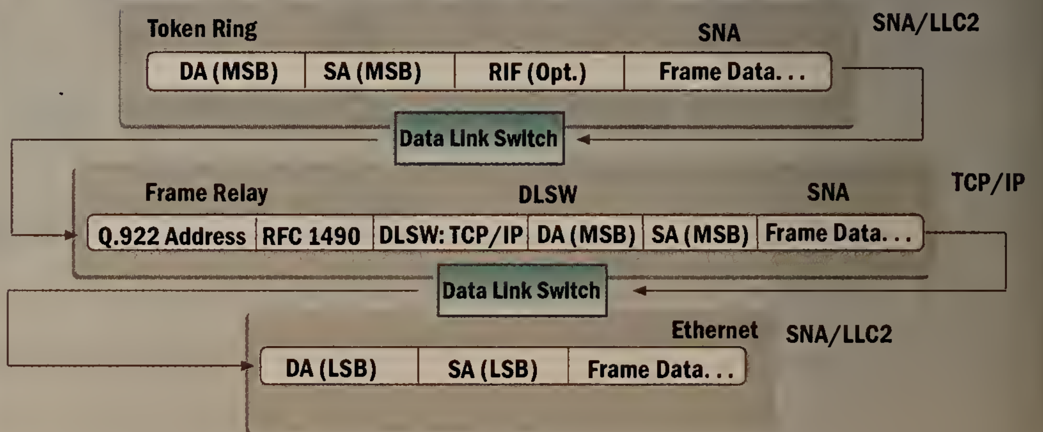
LINKING ETHERNET TO TOKEN RING: TWO APPROACHES

Translational bridging



A FRAD that implements a translation bridge approach reconciles MAC layer frame differences between Ethernet and token-ring frames.

Data Link Switching



A more robust and cleaner way to link disparate LANs is by using Data Link Switching. Here, the Layer 2 protocol (in this case, LLC2) is actually terminated by the FRAD, rather than translated. The data is then transported across the WAN in an IP packet.

DA= destination address; **LSB**= least significant bit first (used for Ethernet); **SA**= source address; **RIF**= routing information field;
MSB= most significant bit first (used for TR)

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OVER
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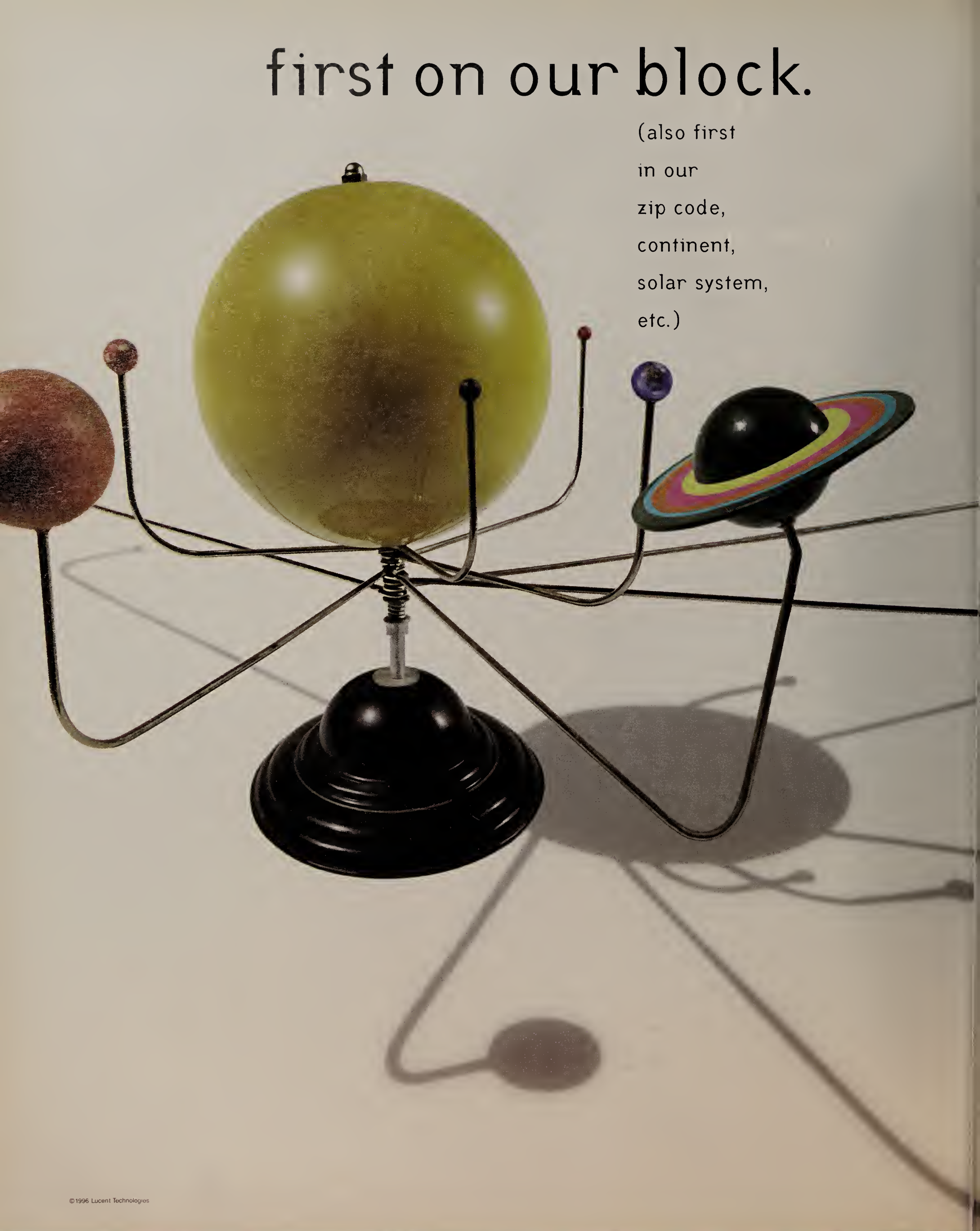

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TOLLY GROUP FRAD CHECKLIST

Vendor	ACC	Cisco	Hypercom	IBM	IBM	Memotec	Motorola	Netlink	RAD
Product	Colorado and Amazon	C2502LF	IEN 3000 and IEN 5000	2210-12T Nways Multiprotocol Router	Nways 2218	CX900	6520 and 6560	TurboFRAD	MAXcess-30 and MAXcess-300
LAN Internetworking									
Ethernet	Colorado - yes; Amazon - optional	Optional	Yes	Optional	Optional	Yes	Optional	Optional	Yes
Token ring 4/16	Yes	Yes	Optional	Yes	Yes	Yes	Yes	Yes	Optional
Bridging	TB, SRB	TB	TB, SRB, SRT, SR/TB	TB, SRB, SRT, SR/TB	TB, SRB	TB, SRB, SRT	TB, SRB, SRT, SR/TB	TB, SRB, SR/TB	Proprietary TB
IP routing	RIP 1, OSPF	RIP 1 & 2, OSPF	RIP 1 & 2, OSPF	RIP 1, OSPF	RIP 1	RIP 1 & 2	RIP 1, OSPF	RIP 1 & 2	RIP 1 & 2
IPX routing	RIP, SAP, RIP caching, SAP and watchdog spoofing	RIP, SAP, RIP caching, SAP and watchdog spoofing, NLSP	RIP, SAP, RIP caching, SAP and watchdog spoofing, NLSP	RIP, SAP, RIP caching, SAP and watchdog spoofing	RIP, SAP, RIP caching, SAP spoofing	RIP, SAP, RIP caching, SAP and watchdog spoofing	RIP, SAP, watchdog spoofing, NLSP	RIP, SAP, RIP caching, SAP and watchdog spoofing	RIP, SAP, RIP caching, SAP and watchdog spoofing
Other routing	AppleTalk, DECnet, XNS	Optional	AppleTalk, DECnet	AppleTalk, DECnet, OSI (partial)		None	AppleTalk, DECnet	None	None
Advanced functions	DLSw	DLSw, DLSw+		DLSw					
Legacy WAN support									
SDLC	Conversion, DLSw	Conversion, BAN, BNN, DLSw, DLSw+, RFC 1490 Annex F	Conversion, QLLC, RFC 1490 Annex F	Conversion, BAN, DLSw, RFC 1490 Annex F	Conversion, QLLC, BAN, BNN, RFC 1490 Annex F	Conversion, QLLC, RFC 1490 Annex F	Conversion,QLLC, BAN, BNN	Conversion,QLLC, BAN, BNN, RFC 1490 Annex F	RFC 1490 Annex F, optional QLLC, BAN, BNN
BSC		3270, 2780/3780	3270, 2780/3780, NCR		3270, 2780/3780, NCR		3270, 2780/3780, NCR	Optional	3270
ASYNC		X.25, X.3, X.28, X.29, ADT, Adplex, Diebold	X.25, X.3, X.28, X.29		X.25, X.3, X.28, X.29, Burroughs Poll Select, IBM 2260	X.25, X.3, X.28, X.29	X.25, X.28, IBM 2260, Burroughs Poll Select	Optional X.25, X.3, X.28, X.29	X.3, Burroughs Poll Select; optional X.25, X.28, X.29
Network management									
Serial Connection	Yes								
Telnet	Yes	Yes	No	Yes	Yes	No	Yes	No	Yes
HP OpenView	Unix, Windows	Unix, Windows	Unix, Windows	Unix	Unix, Windows	Windows	Unix, Windows	Unix, Windows	Unix
Other SNMP Application	SunNet Manager, ACC RiverView	SunNet Manager, IBM SystemView, CiscoWorks, CiscoWorks Blue	IBM SystemView, IENView	IBM SystemView, Nways Campus Manager for LAN	SunNet Manager, IBM SystemView, SyncManager	CX900 stand-alone Version	IBM SystemView	IBM SystemView, SunNet Manager	RADview
SLIP	No	Yes	Yes	No	Yes	No	Yes	No	Yes
PPP	Yes	Yes	Yes	Yes	No	Yes	Yes	No	Yes
IBM Host NetView	No	Yes, includes RUNCMD	No	No	Yes, includes RUNCMD	No	No	Yes, includes RUNCMD, integrated NetView application	No
Voice support	No	No	Yes	No	No	Yes	Yes	No	Yes

OSPF = Open Shortest Path First TB = Translational bridging SRB = Source route bridging SRT = Source route transparent
Note: The preceding are preliminary study results.Not all features/functions verified by press time. Please refer to the full report for final results.

This setup can also reduce hardware requirements and simplify network management because it allows a remote FRAD to send SNA traffic to a FEP without first having to pass either through a partner FRAD or across a LAN-to-mainframe SNA gateway. Support for this feature is strong, with only ACC and Hypercom among the missing.

DLSw, mentioned above, is also an option for SDLC traffic. In many ways, this is a superset of SDLC conversion. The SDLC connection is terminated in the FRAD, but the more sophisticated DLSw routing mechanism is used to transport the data to a partner DLSw device that places the SNA/LLC frames back on the LAN.

Many FRADs also integrate the SNA physical unit concentration gateway function into the units placed at remote offices. This function, available to LLC-based SNA controllers, as well, allows many separate cluster controllers to have their traffic combined (or concentrated) into what the mainframe sees as a single cluster controller, or LLC2 session. This simplifies mainframe VTAM/NCP configuration and conserves memory and processing resources at both remote and host sites. Half of the vendors in our study offer PU concentration.

In summary, when looking at SDLC connectivity, customers should take a hard look at which connectivity options are available on the host before leaping into any vendor's solution. After all, buying a product that supports SDLC/BAN conversion won't help if you don't have a frame relay interface on the FEP.

BSC won't go away

IBM's Binary Synchronous Communications protocol became technically obsolete in the mid-'70s when IBM began shipping communications devices based on its SNA/SDLC protocol. Yet devices based on BSC refuse to go away. This is especially evident in the banking industry where banking terminals and even automated teller machines are using BSC to communicate.

While BSC devices can run 3270 and remote job entry application protocols found on today's SNA networks, they run incompatible, pre-SNA versions. Thus, BSC streams are not easy candidates for conversion the way SNA/SDLC streams are.

To make matters worse, BSC was only semistandardized. Even products from IBM, the inventor of BSC, implemented it in different ways. Years ago, I remember hearing that there were some 17 variations of BSC. I'm not sure that is correct, but the point is clear: BSC support has to be considered device by device.

Thus, as you consider the BSC support offered by FRAD vendors, keep in mind that the only way you can be sure a FRAD will support a particular BSC device is by hooking it up and trying it. It is no fault of the FRAD vendors; BSC is just a tough beast to tame. So take any listing of BSC support you see in a specification sheet as probable. (Note: Validation of BSC support is not within the scope of The Tolly Group study.)

SET YOUR SPEED DIAL

Most FRADs support the configuration of as many as four different data rates:

- **Committed information rate**
- **Excess information rate**
- **Physical port speed**
- **Minimum information rate (used during congestion)**

More than half of this group of vendors offer support for the mainstream BSC protocols: interactive BSC 3270 and batch mode (printer) 2780/3780. A subset of this group also supports non-IBM, vendor-specific BSC derivatives such as NCR BSC.

There's a simple rule of thumb you can apply to exotic BSC protocols: If you don't know what they are, you don't need them. There is little if any new deployment of BSC technology. Unless you are in the business of acquiring banks, you don't need to pay much attention to this area.

Interestingly, FRAD vendors are actively broadening their support for BSC protocols. This proves once again that it is nearly impossible to phase out a technology that proves capable of getting the job done no matter how old or out of fashion it becomes.

Asynchronous support

While not out of fashion, asynchronous communications is certainly old. This most primitive and simplest method of communication is still all that is needed for many jobs, including configuring FRADs. Alarm systems and building environmental monitoring systems also use asynchronous communications.

Most vendors will provide some way for

carrying asynchronous traffic across the frame relay network to a remote asynchronous host. Roughly half the products support Burroughs Poll Select, and most provide support for X.25 over asynchronous lines.

Again, because of variations in traffic flows, protocol peculiarities and timing considerations, asynchronous support is best considered application by application, system by system. Cisco, in particular, seems aware of that. The vendor lists a variety of system protocols, such as ADTs with which it works.

ABOUT THE 1996 FRAD INDUSTRY STUDY

As this story makes clear, frame relay offers powerful techniques for both reducing costs and managing network traffic, but it also brings many challenges. FRAD vendors meet these challenges in myriad ways. In an effort to show product differences and provide network managers with the comprehensive data required to make purchasing decisions, The Tolly Group has applied its Industry Study model to frame relay access devices (FRAD).

FIND IT ON FUSION 1408

The Tolly Group evaluated key aspects of FRADs: performance, protocol support, network management, price and advanced functions, including congestion response, compression, voice integration and bandwidth management.

Invitations to participate in the testing were sent to all FRAD providers. The participating vendors funded this research project.

The 200-plus-page electronic report containing the results of this study are available worldwide at no charge. This hands-on buyer's guide will be updated during the remainder of 1996 as additional products are evaluated.

Furthermore, vendors were invited to submit a response to four RFPs formulated by The Tolly Group for FRAD equipment: one each for token ring and Ethernet, with and without voice. The vendors' responses — including equipment pricing, service costs and network management — are included in the report.

You can access this information via Network World Fusion. Type the number above in the DocFinder box on the home page.

Network World Fusion
http://www.nwfusion.com

FRAME RELAY SPECIFICS

Frame relay offers a rich yet complex feature set that, in theory, gives customers a greater level of network control and higher performance than traditional leased-line solutions offer. Consequently, the depth of support of frame relay-specific features in a given FRAD will largely determine how much you'll get out of the technology.

Multiple PVCs per port

Support for the most important core frame relay functions is universal among the FRADs in this study. All products can support multiple PVCs on a single physical port. And while the number ranges from a few dozen PVCs for the IBM 2210-12T to more than 18,000 for the ACC Amazon, even the smallest numbers will be ample for most installations.

Because most frame relay providers charge for each PVC, you'll not likely want to configure more than required. So before you buy a FRAD based on the number of PVCs it supports, ask yourself how many you really need at each site. Then ask the vendor whether you can upgrade later to a higher number if you need to.

Rate control

Frame relay not only allows multiple logical connections on a single physical port, but it also supports two data rates on each logical connection: a committed information rate (CIR) and an excess (or burst) information rate (EIR). Both are independent of the physical port speed.

The FRAD needs some mechanism to guarantee that it never sends traffic into the frame relay network above the EIR

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October	2	Baltimore
October	3	Charlotte
October	8	New York
October	9	Ottawa
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December	3	Scottsdale
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December	11	Newport Beach

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September	12	Germany
September	16	Germany
September	17	Germany
September	18	Germany
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September	24	Amsterdam
September	26	London
October	2	South Africa
October	3	South Africa
October	4	South Africa
October	16	Paris
October	17	Milan
October	22	Stockholm
October	23	Frankfurt
October	24	Munich
October	25	Madrid

ASIA-PACIFIC

September	2	Taiwan
September	4	Singapore
September	6	Indonesia
September	9	Philippines
September	10	Malaysia
September	12	Thailand
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since such traffic would immediately be eligible for discard. In other words, the FRAD must keep a very careful accounting of how much data is sent to each logical connection — something traditional bridge/routers never had to do.

Although support for CIR/EIR configuration was weak a few years ago, this has been remedied: All FRADs in this study allow the user a fine level of control over both the CIR and the EIR.

GETTING PRIORITIES STRAIGHT

FRADs may prioritize traffic streams according to:

- ▶ Protocol
- ▶ Virtual circuit number
- ▶ Discard eligibility

Congestion response

Another important feature to consider is support for congestion notification and response. Frame relay switches notify the FRAD of congestion elsewhere on the network through Forward and Backward Explicit Congestion Notification (FECN and BECN). BECN travels in the opposite direction of the congestion and notifies the sending end device; FECN notifies the receiving end.

All of the products except Hypercom's respond to BECN in some way, usually by reducing the data rate from the EIR to the CIR. Cisco and IBM can even drop below the CIR. IBM, with its 2218, as well as Cisco and Netlink reduce the LLC acknowledgment window for SNA, and RAD transmits XOFF signals for asynchronous traffic.

Beyond BECN, frame relay supports a more proactive congestion notification system known as Consolidated Link Layer Management (CLLM). Only IBM's 2218, Motorola, Netlink and RAD can respond to CLLM. As for FECN, there is little a FRAD could do on its own to respond effectively. However, Cisco stands alone in forwarding the FECN information on to the LAN for DECnet and OSI — protocols designed to respond to such information.

NETWORK MANAGEMENT

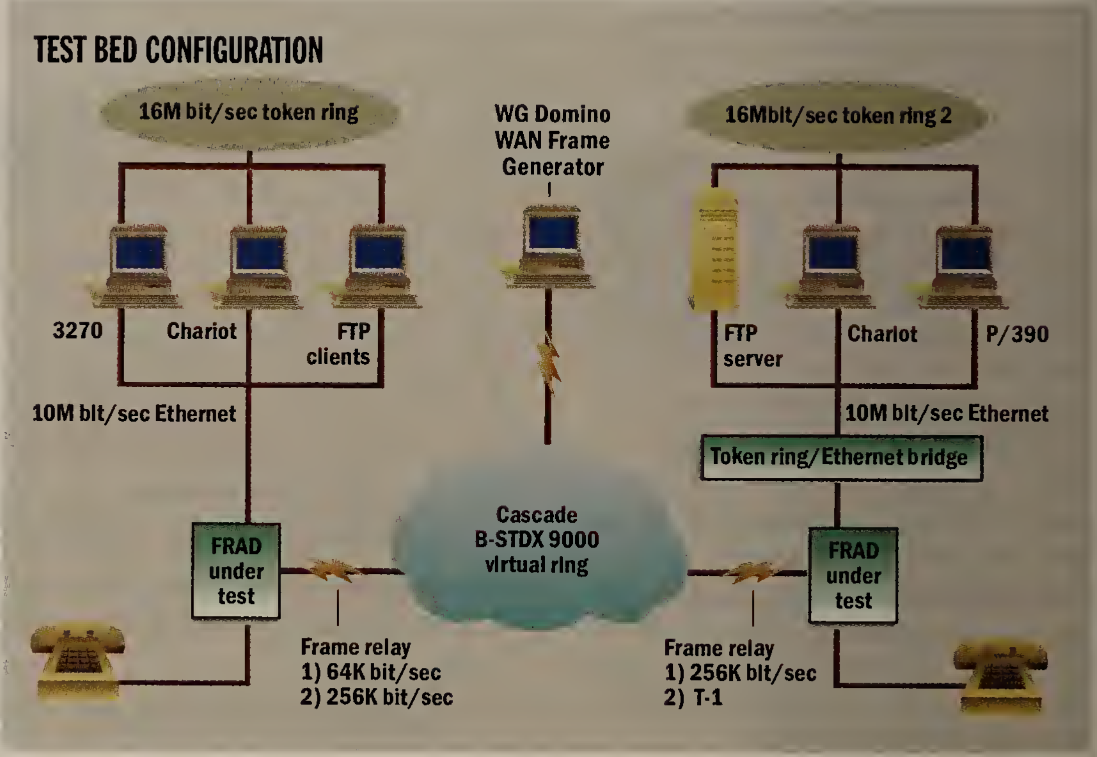
If The Tolly Group's participants are any indication of the FRAD industry at large, network management is a strong suit for this industry.

All products in the test support configuration via a simple console/serial connection, and either Hewlett-Packard Co.'s OpenView for Unix or OpenView for Windows. (Most support both.) However, support for other SNMP management applications, such as Sunsoft, Inc.'s SunNet Manager and IBM's SystemView, is inconsistent.

Even more significant differences lie in the FRADs' support for IBM's host NetView — the standard SNA management application. Currently, fewer than half of the FRADs support NetView visibility.

Cisco's and Netlink's products along with IBM's 2218 actually allow NetView to control the FRAD from the NetView console via RUNCMD. Netlink even provides a NetView-based application for centralized management of the FRAD, and the console interface on the FRAD translates native VTAM commands into the FRAD's own command syntax.

So if you're currently running NetView and are thinking about frame relay, consider putting NetView support high on the list of requirements.


TEST BED CONFIGURATION

VOICE

Frame relay was originally designed for bursty LAN traffic — not for delay-sensitive constant bit-stream voice traffic. However, many FRAD vendors include voice over frame relay as a standard feature in their product lines, and such products generally support an ample selection of features to make voice over frame relay a tempting alternative to the public switched telephone network.

Of those in our study, four vendors provide voice support: Hypercom, Memotec, Motorola and RAD. And the market is still growing.

IBM will support it in a future version of the 2218, and Cisco supports it in another FRAD product. Obviously, voice support is rapidly becoming de rigueur for success in the FRAD market.

All FRADs that support voice include the most common telephone circuit interfaces, fax and silence suppression, whereby network bandwidth utilization is dramatically reduced during periods of silence.

Considering that in most telephone conversations the stretches of silence between speech account for about 50% of the call's duration, silence suppression can yield considerable savings in terms of bandwidth utilization and its associated costs.

One significant product differentiator may be the effectiveness of voice compression. Don't be intimidated by the variety of standards for compressing voice signals.

What really counts is how well each compression technique operates within a given FRAD in a real-world environment.

Instead of asking, "Which compression technique do you use?" ask, "How much bandwidth does your system require? How quickly does silence suppression activate? How good is the audio quality? How many voice channels can I run concurrently?"

Of course, these questions can be best answered through hands-on testing, and the results of The Tolly Group's tests — which should available in few weeks — will show just how well each product performs.

Another differentiator that must await testing is the ability to balance voice and data over a single frame relay connection without one traffic stream adversely affecting the other.

Most voice-compatible FRADs can prioritize data and voice, but how well they do it remains to be seen.

It's clear that frame relay offers many benefits and presents many challenges. It's also clear today's FRAD industry offers a variety of often disparate solutions for addressing these issues.

The customer must remember that subtle differences in solutions can mean the difference between resounding success and tragic failure.

Matching your requirements with the offerings of a particular FRAD is the only way to guarantee a successful frame relay installation.

Tolly is president and Curtis is senior engineer/analyst with The Tolly Group, a strategic consulting and independent testing firm in Manasquan, N.J. They can be reached at (908) 528-3300 or via the Internet at ktolly@tolly.com or jcurtis@tolly.com.

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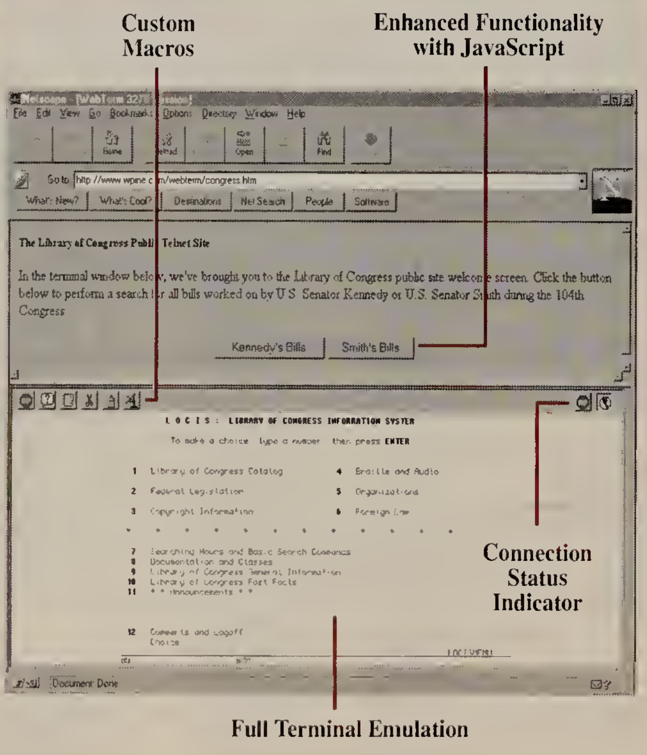
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NT Server: Not there yet

Windows NT Server 4.0 speeds down the 'Net highway but hits a pothole on its way to the enterprise.

By Chris DeVoney

ROB BOLSTER

With its latest NOS now shipping, Microsoft Corp. can rest assured about at least one thing: It won't be facing any Justice Department charges that it is unfairly blowing away the competition.

Windows NT Server 4.0 is stuffed with Internet/intranet tools, better connectivity choices, more administrative features and a user interface transplanted from Windows 95 — all welcome, if not compelling, improvements. This version is faster than its predecessor in core server functions such as file, print and network control services.

But 4.0 leaves us wanting more. The new version is cordial but not friendly, broadly encompassing but missing key details. Although excellent in small-to-midsize shops or for specific applications, its directory services aren't strong enough to handle the users and objects for an entire enterprise. In short, the product is a better network citizen than before, but not a NetWare killer.

Shipping a new attitude

Two key architectural goals for Windows NT Server 4.0 were to reduce the cost of ownership and make common operations easy. To meet the latter goal, Microsoft grafted the tried-and-true Windows 95 user interface onto NT.

The new interface presents a cleaner launchpad for programs and utilities, abandoning the myriad overlapping folders of Program Manager for the simplified Start button and pop-up menus (see Figure 1, page 64).

Several new and revised applets ease some standard administrative burdens. An enhanced Task Manager provides at-a-glance details on memory and CPU usage systemwide, by application and by process. Task Manager also doubles as an ejection seat for nonresponsive processes.

The Network Monitor, formerly part of Systems Management Server, captures and analyzes network traffic, useful for pinpointing station, hub, router or segment troubles. The improved Diagnostics tool exposes device driver, network and system resource information, such as Direct Memory Access (DMA) and Interrupt Request (IRQ) use.

Wizard technology, which provides step-by-step directions for completing complex tasks, finds a welcome home in Server 4.0. Several wizards for adding or removing programs, modems and printers came directly from Windows 95 to NT.

New wizards provide guidance on common administrative tasks: adding new users, creating and managing user groups, setting up shared folders and drives (with appropriate security settings) on Microsoft and Novell, Inc. networks, and installing or updating network client workstations. The wizards ensure that you specify all necessary parameters for a user or service.

Remote Web administration, a free add-on that works with Internet Information Server (IIS) 2.0 or any Web server that supports Microsoft's Internet Server API, lets you use a Web browser (such as Netscape Navigator or Microsoft's Internet Explorer 3.0) to remotely manage users, groups, shared directories, sessions, print jobs and queues, server shutdowns, log viewing and server reconfiguration (see Figure 2, page 64). The feature makes remote management of any server practical whether you're in the office or at home, no matter if the server is on the Internet or an intranet.

With its uncomplicated installation and remote administration, this network operating system (NOS) can be installed, configured and maintained with minimal knowledge and experience. NT Server 4.0 is at home in small businesses and corporate departments with no dedicated administrator, where maintenance is handled remotely.

Fair-weather friendliness

Unfortunately, NT 4.0's congeniality is best described as fair-weather. The product wilts under the pressures of managing large enterprises.

The shortcomings are most painful in the new area NT wishes to serve: Internet-related networking. Setting up Domain Name Service (DNS) or Dynamic Host Control Protocol (DHCP) services, for example, remains as cryptic as ever (see Figure 3, page 65). The online help defines parameters, like subnet mask, but fails to identify their significance or proper settings. The skimpy printed documentation offers even less help.

Some aspects of the new interface are elusive. For example, no icon exists within the Start menu for Task Manager. You must start Task Manager from a pop-up menu invoked by right-clicking an empty section of the Taskbar or picking a button

NetResults

Product	**Windows NT Server 4.0**
Vendor	Microsoft Corp. (800) 426-9400 www.microsoft.com
Price	See table, page 64
Pros	▲ Easier server administration ▲ Better file and print performance ▲ Complete Internet/intranet starting services management
Cons	▼ Lack of meaningful help in some key areas ▼ Poor documentation ▼ Directory services inadequate for large networks

SCORECARD	Windows NT Server 4.0
Overall score	**7.4**
Naming and directory services (20%)	7
Management/ administration (20%)	7
Networking/connectivity options (10%)	8
Performance (10%)	8
Messaging (10%)	5
Security (5%)	9
Enterprise scalability (5%)	5
Stability (5%)	9
Flexibility and ease of use (10%)	9
Installation and documentation (5%)	8

Scores based on a scale of 1–10. Categories are weighted by the percentages shown.

from the Ctrl-Alt-Del pop-up. We found this tidbit only when searching the index of NT's Help file for Task Manager.

NT also offers little help in identifying components in the Control Panel's Devices applet. A Help button is not even offered when configuring many network items in the Control Panel such as NetWare or IP protocols.

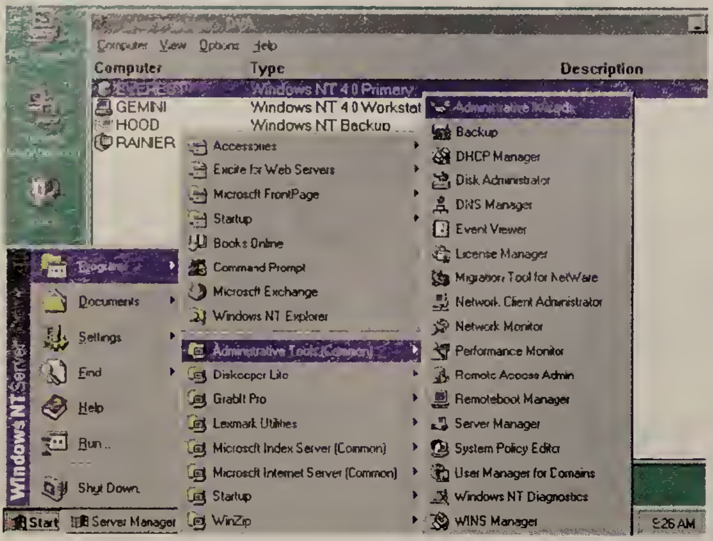


Figure 1: *NT Server 4.0's new look comes directly from Windows 95. Most common administrative functions are grouped into one folder off the Start menu for easy access.*

The Systems Properties window, used for controlling user profiles, hardware profiles and start-up/shutdown properties, strangely cannot be minimized. Fortunately, NT, unlike Windows 95, almost always shows a Browse button to search disks for selected device drivers.

Microsoft's domain-based security model is not as robust as Banyan Systems, Inc.'s StreetTalk (a version of which was just released for Windows NT, and will be reviewed in *Network World* shortly). Domains depend on manually established trust relationships, in which one domain recognizes the users and groups of another. Trust relationships can be bidirectional.

Because domains can have multiple trust relationships, with potentially different administrators for each domain, keeping everything current in a large organization with many users and domains can be a daunting task.

The road to Cairo

What of Cairo, the long-awaited distributed network operating system? Not in time for 4.0, at least.

Microsoft's Senior Vice President Jim Allchin says many Cairo features will be implemented as incremental improvements to NT. According to sources within and outside Microsoft, this is the probable schedule for the some of the improvements:

October: Falcon (message-based middleware technology), Viper96 (scalable transaction processing technology), and common device driver APIs for Windows 95 and NT components

December: DirectX APIs and Internet Explorer 4.0

February 1997: First phase of clustering using hot transfer to back up servers

Late 1997: First release of Cairo (NT 5.0), with Plug and Play and power management, and second phase of clustering using load balancing.

— *Chris DeVoney*

Still, the improvements in usability over NT 3.51 are significant and raise the standard by which NOSes are judged. NT Server remains friendlier than its competitors despite its shortcomings.

Performance

NT Server 4.0 also offers some performance advantages over its predecessor. The extent of the gain depends on the setup.

For instance, 10M bit/sec Ethernet shows a modest 5% improvement in file server operations over NT Server 3.51, while 100M bit/sec Fast Ethernet networks do much better. We saw a 45% improvement in NT 4.0 over NT 3.51 for a single-processor Compaq Computer Corp. ProSignia server and a 60% improvement on a dual 166-MHz Pentium ProLiant server.

Using a single printer on either machine, we saw increases of about 10% in total actual printing times. However, with some complex spreadsheet and long word processing documents, the applications returned from printing up to a minute and a half faster on jobs lasting up to five minutes.

For Web services, the combination of NT 4.0 and IIS 2.0 showed better than a 30% improvement over NT 3.51 and IIS 1.1 when browsing or transferring files over Ethernet connections. We saw little improvement when connecting over basic ISDN service through national provider PSINet, Inc. as expected, since the much slower 128K bit/sec rate of ISDN remains the restriction.

According to Microsoft, internal improvements allow NT to scale on machines with up to 32 processors, up from the previous de facto limit of four.

Acknowledging the "I" words

Another design goal was boosting NT's stature as an Internet or intranet server. Microsoft succeeds by stuffing an Internet starter kit into the package.

Server 4.0 arrives at your door with Internet Explorer 2.0 Web browser and IIS Version 2.0 Web, File Transfer Protocol (FTP) and Gopher server. If you want the newer, much-ballyhooed Internet Explorer 3.0, you can download it from the Microsoft Web or FTP site. Also included is FrontPage 1.1, an adequate HTML page editing and site maintenance tool. Index Server, available at the Microsoft Web site, provides a search engine for most Microsoft Office application documents, as well as HTML pages, at your site.

These tools combine with regular NT applets, such as User Manager, Performance Monitor and Event Viewer, to provide user and system oversight. With them, you can establish and maintain effective Internet and intranet sites by dropping an NT Server into the organization.

However, the package is most suited to beginner sites and doesn't fill all the Internet/intranet needs of experienced Webmasters. Missing are chat, E-mail and Usenet newsgroup services, the security infrastructure for merchant transactions and a firewall against outside intrusion.

Working with networks and NetWare

On the other hand, NT becomes a better corporate network citizen with this release. Some additions are aimed at NetWare users; some extend other networks.

NT finally handles NetWare login scripts, which are frequently used to speed up long or complex drive and device mapping and searches. NT also comes with gateway services to NetWare file and print servers, and a migration tool that converts NetWare login scripts into NT. File and Print Services for NetWare and Directory Service Manager for NetWare are optional, additional-cost add-ons.

NT Server can manage and configure network objects after logging into a NetWare directory tree. Unfortunately, the support is for bindery emulation mode only, but there is support for Novell Directory Services 2.X and 3.X objects. NDS 4.0 structures, alas, come later.

NT 4.0 routes AppleTalk, IPX and TCP/IP protocols. PCs, Macintoshes and Unix computers can communicate on a single network without multiple protocols on each client. NT Servers can act as protocol routers in direct LAN-to-LAN connections but not over remote connections.

DNS, which resolves fixed IP addresses to machine names, has been integrated with Microsoft's Windows Internet Naming Services (WINS), which resolves names of machines whose IP addresses are dynamically assigned. This lets users access or browse shared directories or resources using names such as \\server1\company.com\public.

With Remote Program Loading (RPL) service, small and large businesses can deploy lower cost diskless Windows 95 clients to boot and run from the NT server. The System Policy Editor and User Profile Editor (both add-ons brought over from Windows 95) give administrators better tools to standardize desktop configurations and control user environments for individuals or groups across the network.

Hard-copy services get a boost with a new rendering scheme and printer pooling. NT clients can send a metafile version of a document. The server handles the graphical device interface rendering from metafile to printed page, which cuts network traffic and speeds the apparent printing time before the application returns to user control.

NT SERVER VS. NOVELL NETWARE LICENSING PRICES

# of users	Windows NT Server 4.0	Novell NetWare 4.X
5	$809	$712
10	1,129	1,362
25	1,468	2,402
50	2,204	3,247
100	3,754	4,547
250	8,404	8,122
500	16,154	16,247
1,000	28,809	31,197

Microsoft publishes estimated street price, and Novell lists the higher suggested retail prices. To make a fair comparison, we reduced listed NetWare prices 35% (what Novell says is the typical reseller's discount).

For printer-bound groups, NT can dynamically direct print jobs between two or more pooled printers that can use the same printer driver.

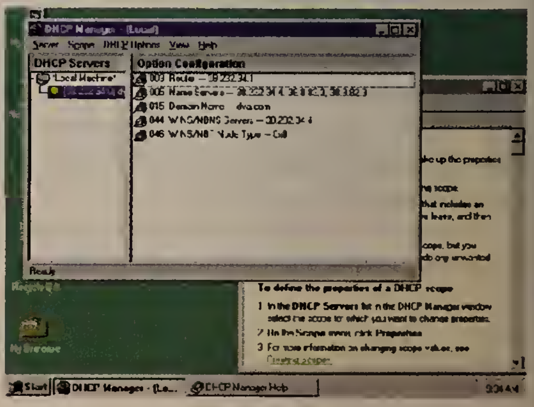
NT Server 4.0 still depends on the optional Exchange Message Server or another messaging product for electronic mail. Server 4.0 can establish and maintain mailboxes for a workgroup of Exchange clients, but won't handle enterprisewide or Internet mail duties without additional software.

Serving remote users

Changes in Remote Access Services (RAS) offers exciting possibilities to gain performance or pinch pennies.

For performance, NT offers channel aggregation, technically called Multilink PPP, to boost connection speeds. Typically, this enables the two 64K bit/sec B-channels of a basic ISDN line to be bonded into a 128K bit/sec link to the provider.

NT 4.0 handles this same bonding but with a twist: The server can mix multiple analog or digital communications links. For example, we successfully connected three U.S. Robotics Courier V.34+ analog modems to a server running a modem pool for combined throughput of 86.4K to 100.8K bit/sec. This pooling rivals ISDN speeds in areas where ISDN service isn't yet available or is more costly than the multiple analog line approach.



015 Domain Name dva.com

To define the properties of a DHCP scope

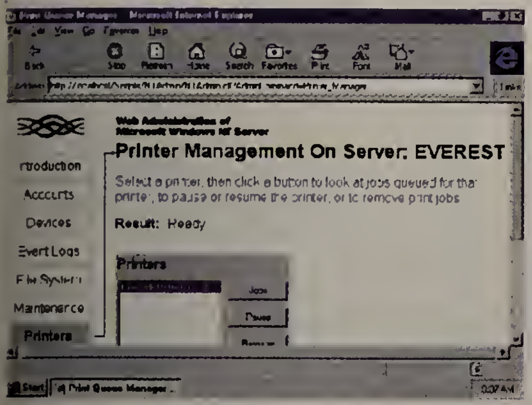
1 In the DHCP Servers list in the DHCP Manager window select the scope for which you want to change properties.

2 On the Scope menu, click Properties.

Figure 2: *Using the optional Remote Web Administration with IIS, administrators can handle most server management functions with their Internet browsers.*

The new Point-to-Point Tunneling Protocol (PPTP) turns the Internet into a low-cost secure carrier. Users can make a local dial-up call to Internet service providers or national networks such as America Online or CompuServe and make a secure RAS connection to the corporate network.

Using NT authentication and encrypting of the encapsulated packets, the public connection stays secure. However, RAS can't handle LAN-to-LAN connections, so your branch offices will have to rely on other options to connect back to a central site.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Jobs
Pause
Start
Print Queue Manager

Printer Management On Server: EVEREST

Select a printer, then click a button to look at jobs queued for that printer, to pause or resume the printer, or to remove print jobs

Result: Ready

Printers

Figure 3: *NT Server 4.0 friendliness stops short with services such as DHCP Manager. The online help or Books Online doesn't list which items are mandatory fields nor the potential values for IP ranges. The only real help is found in the optional Windows NT 4.0 Resource Kit.*

We set up our Compaq NT 4.0 server for RAS and PPTP, then connected it to the Internet using PSINet. While at a remote location, we connected a Compaq LTE 5300 running NT Workstation 4.0 to the Internet via a local ISP and established a PPTP connection to our server.

PPTP was relatively easy to set up and easier to use. We noticed, however, a slight drop in throughput (less than 4%) connecting through the Internet compared to a direct connection, more from NT's additional encryption than the vagaries of an Internet connection. In all other respects, the PPTP connection was no different than the direct RAS link.

While PPTP offers one way to pinch the corporate penny, NT's resumable file copying saves time, money and aggravation. Rather than restarting an interrupted file copy operation from scratch, the new /Z switch lets Copy continue the operation from where it was interrupted once the connection is resumed.

You can impose idle-time limits on RAS connections, which can save connection costs and more quickly free dial-up resources. Unfortunately, the time limit applies systemwide to all RAS connections, with no latitude to grant variations to groups or users.

Finally, NT automatically dials out whenever an application needs a remote network connection. Like Windows 95, you don't need to pull up the RAS window before launching the application, and, unlike Win95, you can enable AutoDial by

HOW WE DID IT

We tested Windows NT Server 4.0 on two Compaq Computer Corp. servers: a single-processor ProSignia 150 with a 150-MHz Pentium processor, 256K bytes of cache, 64M bytes of RAM, a 2G-byte SCSI drive, and a 10Base-T Netflex 2 and 100Base-TX Intel Corp. PCI EtherExpress Pro 100 network cards; and a ProLinea 1500 with dual 166-MHz Pentium processors, 512K bytes of cache, 128M bytes of RAM, dual 4G-byte fast-wide SCSI drives, and a Compaq 3/P network card with either 10Base-T or 100Base-TX modules. We accessed the servers from 10 client machines, ranging from a 100-MHz 486 to 200-MHz Pentium Pros, all running 10Base-T or 100Base-TX network interfaces. The machines and servers were linked using a Hewlett-Packard Co. AdvanceStack 10Base-T hub and an Intel EtherExpress 100Base-TX hub. When required, an Intel 10M/100M bit/sec Downlink connected the hubs. We used Business Applications Performance Corp.'s SysMark for Servers Version 1.0 and a custom program performing reads and writes to increase the network load on the server.

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individual destination.

More features under the hood

Servers today are accepting more tactical roles as database, distributed computing and special services machines. Some of NT's 4.0 makeover is directed at making NT a better applications server.

The long-awaited Telephony API (TAPI) 2.0 is integrated into NT Server 4.0. TAPI mediates serial port contention between voice, fax and modem applications. Long-term, look for further integration of server control over faxes and PBX phone networks.

Also buried within NT is support for Distributed Common Object Model (DCOM), a technology first introduced in Visual Basic as Network OLE and a competitor to Common Object Request Broker Architecture. DCOM empowers applications to access OLE objects across a network, including servers on the 'Net or intranet, via remote procedure calls.

For example, a Web browser could communicate with an object on a server that delivers live stock quotes. The same basic technology could make an in-house database link for intranet applications. However, don't expect significant off-the-shelf support for DCOM until early next year.

The new Cryptography API (CAPI), which will be shared with Windows 95, provides a standard set of techniques for encoding both data and messages and supports digital signatures and certificates.

An unannounced disk API helps utility program makers. Under the old scheme, disk management products made intimate calls into the NT Executive and were made obsolete with each service pack release. The new scheme gives utilities independence from operating system changes and, thus, reduces the upgrade burden.

Easy installation, slim documentation

NT retains its reputation as one of the easiest operating systems to install. The initial bootstrap on Intel processors requires three provided diskettes. Reduced Instruction Set Computing-based computers invoke the option to run the startup code right from the CD-ROM.

Servers such as the Compaq ProSignia or ProLiant lines, which understand the bootable El Torito format, can jumpstart NT Server 4.0 directly from the CD-ROM media.

When upgrading from another version of NT Server, you can install 4.0 onto the hard disk, likewise enabling you to avoid the boot diskettes.

NT Server 4.0 cannot upgrade Windows 95 installations gracefully, but that problem primarily affects those upgrading to NT Workstation 4.0. Few machines

For a perspective on how Windows NT Server 4 compares to other network operating systems, see Network World Fusion. Type the number at right into the DocFinder box on the home page.

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We're looking for a few good product reviewers. If you have specialized expertise with switches, routers, frame relay, mainframe/LAN connectivity or other hardware areas, let's talk. Send E-mail to Test Center Director Lee Schlesinger at lschlesi@nww.com.

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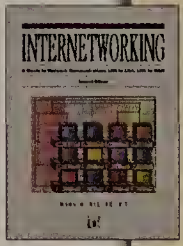

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NT's documentation in 3.51 consisted of a slim installation manual and an optional multivolume "box-of-docs." In 4.0, Microsoft provides a basics and installation guide, a concepts and planning guide, and a network supplement. No information is lost in the reorganization, but nothing substantial is added. Nor does the online help (which includes an electronic form of the printed manuals) contribute to an improved understanding of NT Server.

For example, the only reference we found for setting the RAS idle-time disconnect function was a brief one-sentence response that directed us to the online help for the System Policy Editor. In turn, that help file contained a single sentence about "unsuccessful (idle) attempts."

Because the concise documentation covers the basics but little else, consider the Microsoft NT 4.0 Resource Kit an absolute necessity. You may also need to visit your local bookstore to find information that the Microsoft documentation omits.

Some remaining weak spots

The importance of what Microsoft left out of the latest NT varies according to your needs.

- The continued absence of plug-and-play installation for hardware components mainly affects workstations but touches servers whenever hardware is changed.
- The lack of a comprehensive logon scripting language remains annoying to all administrators.
- Support for clustering will be added but not until sometime next year, according to Microsoft.
- The big stopper for large networks is the current NT directory paradigm using domains, which is just too awkward. For example, moving shared directories from one NT server to another requires making changes at every client computer that references the directory. Managing even a medium hierarchy can be troublesome.

Conclusion

Overall, Windows NT Server 4.0 is a worthy upgrade, improving file and print performance in today's higher speed networks and maintaining operational robustness. It provides enough tools to lighten training and support burdens.

NT Server 4.0 makes a quick Internet or intranet solution, providing Web, FTP and Gopher services with an excellent onsite search engine. FrontPage arms the staff with enough tools for producing a basic Web site.

The product also remains a good foundation as an application server and, while not fully compatible with NetWare servers, presents enough tools to comfortably integrate NT into Novell networks.

Starting at $809 for a server and five client licenses with upgrades at half the price of new licenses, the product is significantly less expensive than chief rival, NetWare, at most price points (see table, page 64).

Small businesses and large corporations can find a use for NT, either as drop-in specialty servers for a specific need, such as printing or as application servers, or to support a midsize network. However without a reformed directory service, NT falls short of enterprise network needs.

The alliance is a co-operative of users, consultants, educators and integrators that applies its technical and business skills to analyze and compare strategic network products. A list of alliance partners can be found on page 53.

NetworkWorld TEST ALLIANCE

DeVoney is a syndicated computer columnist and author/editor of more than 19 books on personal computers. He is president of DVA, Inc., a writing and technical research firm based in Seattle. He has been involved in the computing industry for more than 20 years and can be reached at cdevoney@connect.com.

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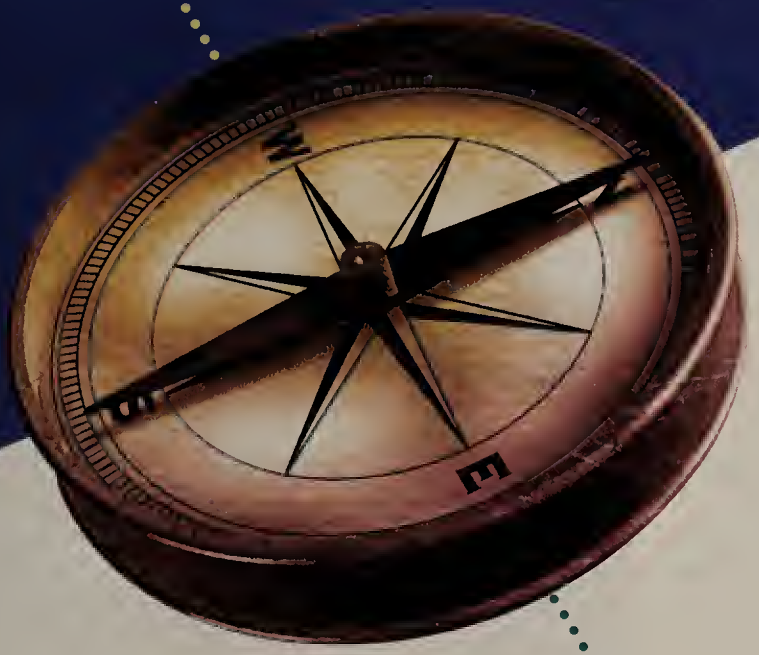

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A trustworthy cynic

A dose of cynicism makes for good project leadership.

By James Carlini

A complex network installation project is coming up and you want to bring in an outsider to lead the charge. Well, you better be prepared to detect and deal with various personalities as you sift through the candidates.

There are three main personality types to watch out for: the pseudo-experts who have mastered the buzzwords, such as paradigm shift and interprocess interoperability, but little else; the critics who are quick to find fault with just about everything; and the cynics who may seem overly negative concerning project progress and quality, but tend to deliver the goods.

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The people requiring the most scrutiny are often the pseudo-experts. These types of people sell themselves as systems integrators, certified engineers or consultants for technological change. They talk themselves into project leadership positions with claims of great skills or vast experience.

Once on board, pseudo-experts get cozy with upper management by expounding on their accomplishments — both exaggerated and imagined. And upper management is all too willing to listen given how savvy these people can be in appearing to know more then they do.

However, their real contributions are often minimal because their technical wherewithal doesn't match their communications skills. For instance, you can't rely on pseudo-experts in a crisis situation or for the help you need when it comes to testing the complex environments they've been asked to build.

It's at those times that you can see right through them because their expertise is so shallow. Or as they say in Texas, "He is all hat and no cattle." But it's too late by then. Usually, these pseudo-experts are already off to another project claiming that the one you are stuck trying to debug is already up and running, thanks to their great expertise.

Carefully checking references that candidates give you is one way to weed out the pseudo-experts (see story, this page).

Next there are the critics — people with some real experience. These people can tell the pseudo-experts are just winging it. Unfortunately, some of the critics' experience is outdated. They may not have all of the up-to-date buzzwords in their vocabulary or know enough about emerging technologies. They do, however, know the previous generation technology very well and have been down the road enough to know when a project's direction or quality assurance is more sizzle than steak.

Upper management usually does not pay much attention to the comments of a critic, opting instead to have more trust in pseudo-experts because they can talk the talk. Critics may have a better chance of making a contribution if they bring their technological skills up-to-date.

Enter the cynic

Of course, you can't forget the cynics. These people may exasperate you and upper management by constantly questioning everything and showing little faith in any existing work. But, more often than not, they know what's going on. Perhaps the critics learned because they were burned on prior projects or too often got brought in to clean up the mess left behind by a pseudo-expert. Whatever the case, cynics have a good idea of how projects should evolve and what's needed to keep them headed in the right direction even in the face of destructive forces.

However, cynics are sometimes viewed as charging too much for their knowledge. They might also be unjustly viewed as negative thinkers. While it may not be what you want to hear, there's often more truth in cynics' observations than they've been credited with.

Upper management brings in a cynic when they begin to get cold feet and are worried that a project is about to fail. That's when nobody complains about salary or consulting costs or whether the price fits into the company's neat little price-to-talent matrix.

For project quality assurance, it's good to have a cynic in charge. The people who get burned first are those who trust the design of the system was done right and don't develop a comprehensive test plan to ensure that it was.

Unfortunately for the cynic, the direction that some senior managers have taken of late is to push for junior people to get the project done at a cost savings. This does not work well in complex or mission-critical environments. You need the depth of expertise that an experienced person has to manage and review projects.

You cannot commoditize that type of talent. If you need an F. Lee Bailey type, you pay for him and you get the results. Period.

Carlini is president of Carlini & Associates, Inc., a Hinsdale, Ill.-based international consulting firm, and can be reached at carlini@nwu.edu or by phone at (630) 986-1888.

Check those references

Everyone knows to ask potential contractors for references, but you actually have to check them out to see whether the firm — including the big-name consultancies — have really parted the Red Sea, as they profess, or just floundered in it.

When you do check references, apply some detective-like techniques to uncover the real story. You want to find out who did the work, whether the work was done well and whether the person giving the reference would rehire the firm. As you snoop around, you might be surprised to find out that the company you're considering to lead a strategic project amassed its so-called "firm qualifications" and "in-depth experience" in projects headed up by people no longer working there. So much for companywide qualifications, which is an irrelevant measure of experience and success anyway.

Consider what the Chicago Police Department discovered when running routine background checks on companies bidding to build the city's 911 system in the early 1990s. In one case, a special evaluation and planning team called people associated with projects a large consulting firm claimed to have done. The team found out that the work was really done by a small firm that specialized in 911 projects. The large consulting company bought out that smaller firm and started supplying the smaller firm's clients as references. The person with the 911 expertise in the small firm was hired by the large consultancy, but he later left. Yet, the consultancy continued using his projects as part of its qualifications statement. The evaluation team's detective work paid off because the pseudo-expert firm didn't get hired.

So remember this: Everyone expounds on their successes. The question is whether or not they directly participated in that success. When people are talking the talk, a little detective work can help you make sure they can walk the walk.

—James Carlini

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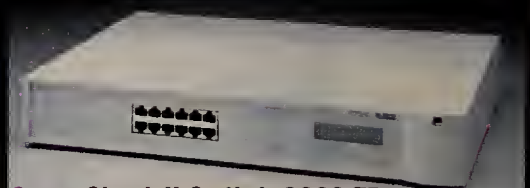

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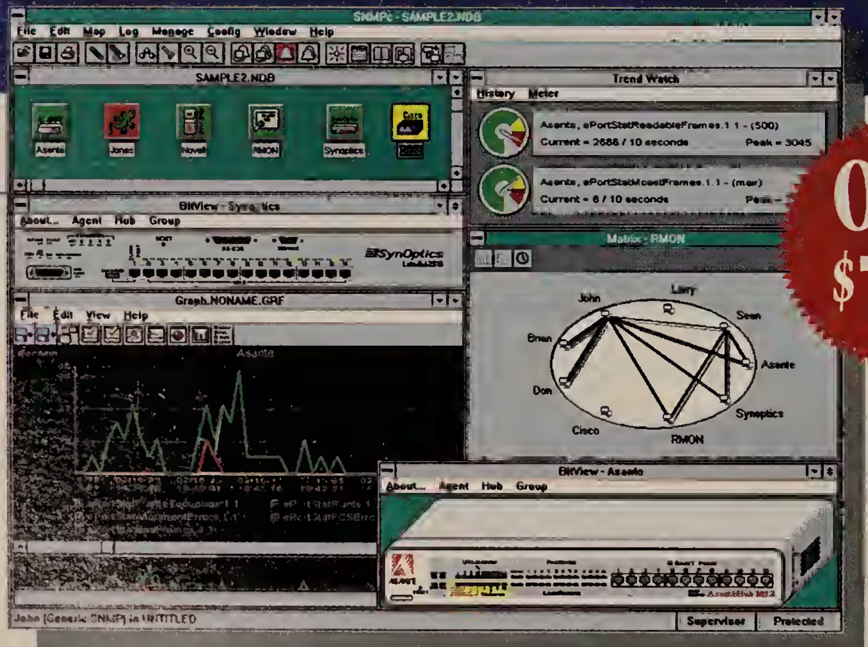

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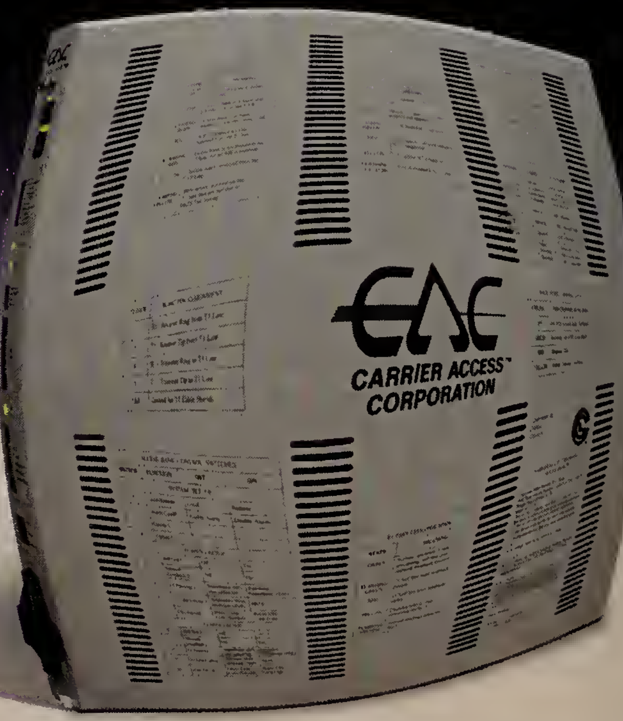

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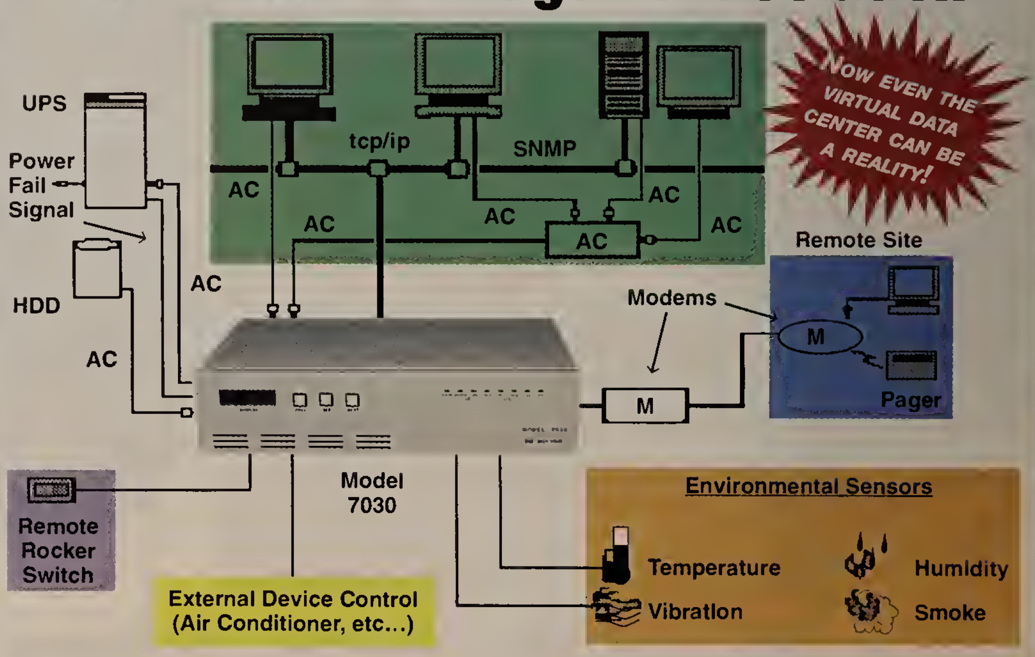

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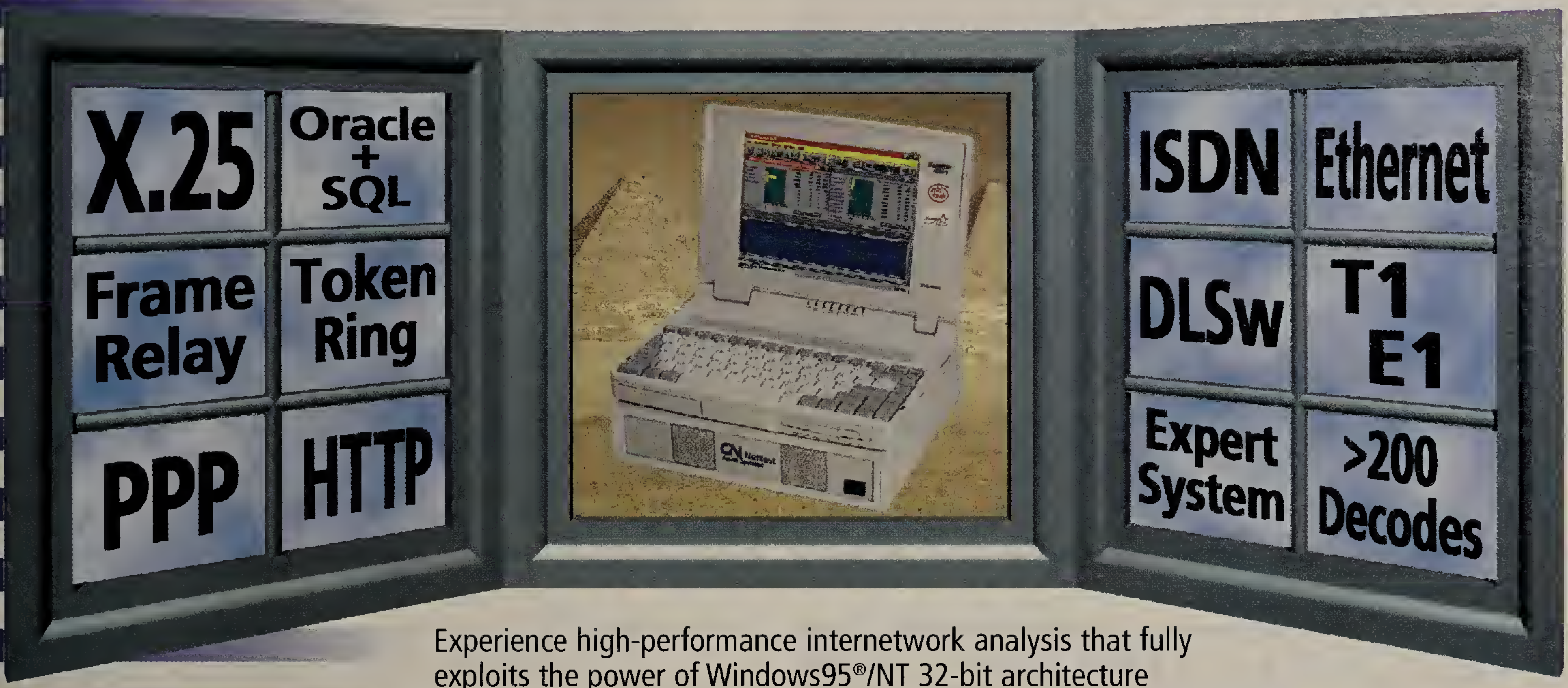

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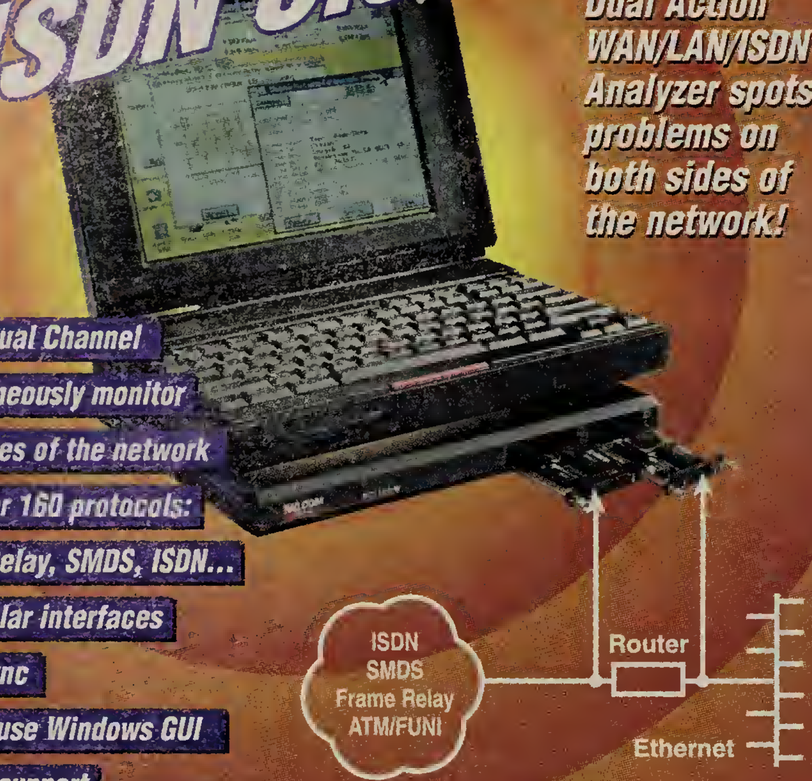

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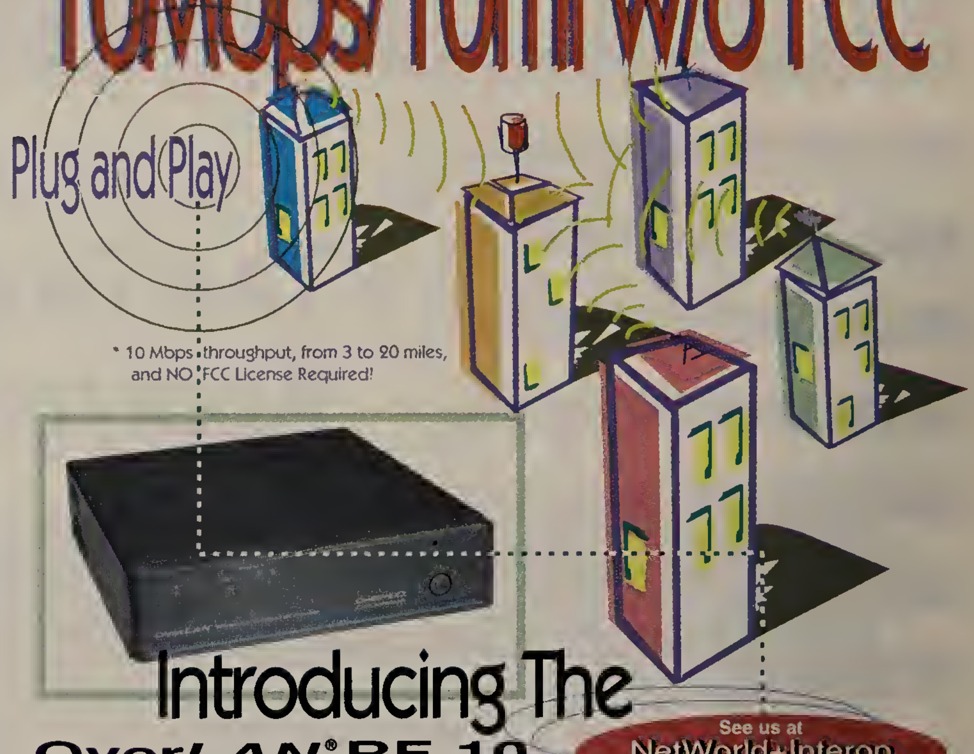

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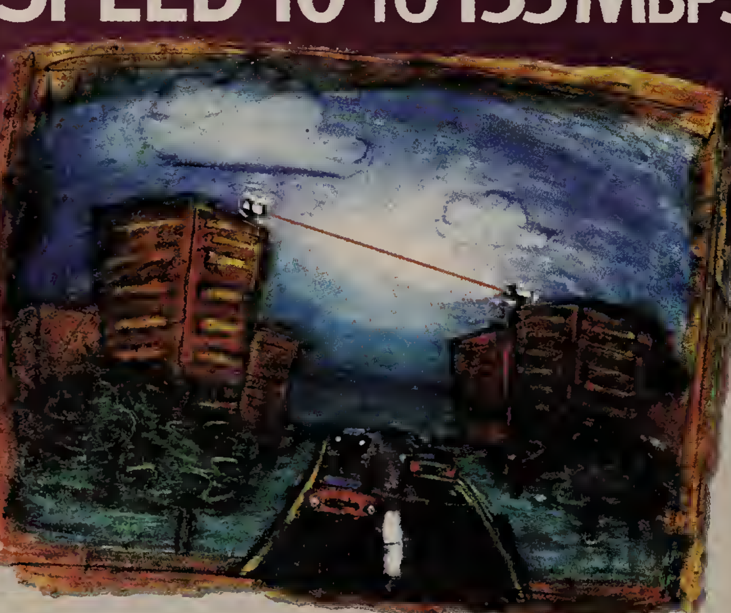

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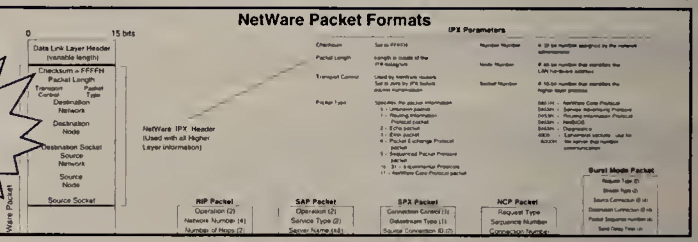

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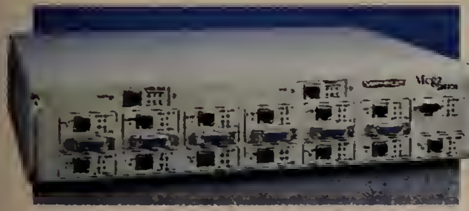

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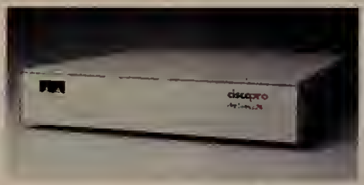

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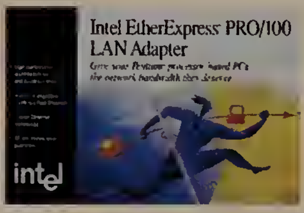

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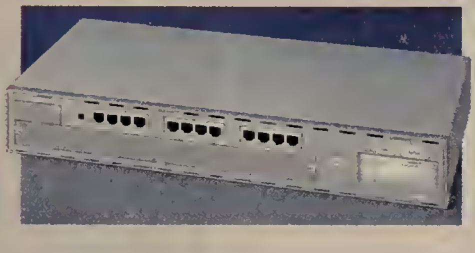

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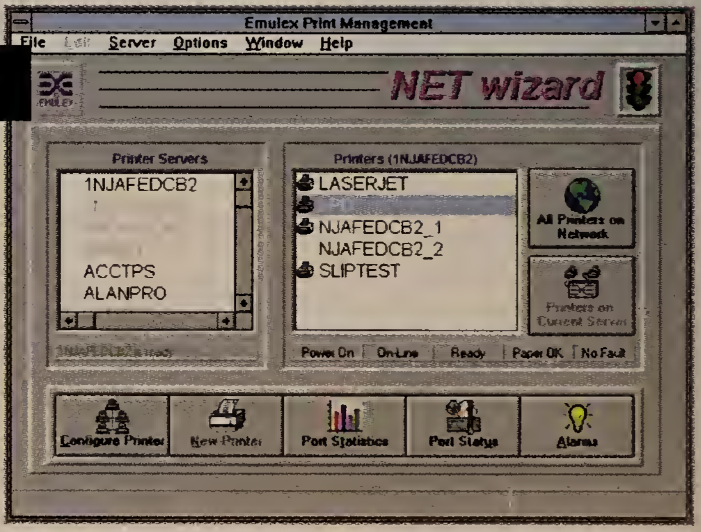

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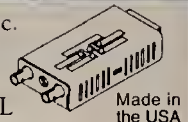

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EDITORIAL INDEX

3Com 1,12
A
Advanced Computer Communications 55
Agile 1,12
Aimnet 23
Alcatel 10
America Online 63
American Express 30
Ameritech 10
AMP 37
Apple 49
Ascend 17
AT&T 17,23
AT&T Business Network 23
AT&T Unisource Services 10
B
Banyan 32,63
Bay 14,20
BBN Planet 6
BellSouth 10
BT 10
C
CA 1,12
Cabletron 1,6
Cascade 56
Cheyenne 1,12
Cisco 1,12,14,20,55
CommTouch 37
Compaq 30,32,63
Compuserve 63
Cray Reseearch 27
CyberCash 45
D
Dacom 23
Data General 27
Datalogix 40
Digital 1,30
Documentum 37
E
Eicon 17
E-Span 70
F
Frontier Communciations 23
G
Ganymede 56
GE Information Services 30
GMBH 23
Granite 1
H
HookUp Communications 23
HP 44
Hypercom Network 55
Hyperion 40
I
IBM 8,17,20,32,45,52,55
Integrated Device Technology 37
Intel 32
Interlink 17
InterNex Information Services 23
Intuit 30
Iona 45
I-Pass Alliance 23
L
Lotus 1,6,14,44,70
Lucent 1,12
M
Madge 20
MCI 10,17
Memotec 55
MFS Communications 23
Micom 17
Microsoft 1,6,8,14,27,30,32,37,44,45,49,52,63,64,84
Monsanto 32
Motorola 55
N
Nat Systems International 40
NetEdge 17
NetFRAME 6
Netlink 55
NetManage 37
Netscape 1,27,37,45,52,82
NetVision 32
Novell 32,44,63
O
OnStream 1,12,17
Open Market 23
Oracle 17,40,45
P
Pacific Bell 10
PeerLogic 40
PSINet 23
R
RAD Data Communications 55
RSA Data Security 45
S
Sahara Networks 17
SBC 10
Silicon Graphics 27,37
SMC 27
SNMP Research 17
Sprint 17
Sun 27,45
SunSoft 14,18
Supply Tech 30
T
Teleglobe USA 23
U
U.S. Robotics 63
UUNET 23
V
Visa International 30
Visigenic 45
W
Worldtalk 1
X
Xylan 20
Y
Yahoo 6

ADVERTISER INDEX

Advertiser	Reader Service#	Page#
*3Com Corporation		38-39
Ascend Communication		7
Azure Technologies	224	75
8ay Networks		88
Bay Networks	236	74
8ellcore		40
C-Spec	287	76
Carrier Access Corp	251	72
Cascade		33
Castle Rock Computing	252	72
ChatCom Inc		16
ComNet		69
Compaq Computer Corp		34-35,50-51
Computer Associates USA		18-19
Compuware Corporatio		30
Cybex Computer Products Corp	227	74
Dell Computer Corpor		2-3
Diginet/Hollister Associates	270	76
Emulex	255	78
Fastcomm Communications		65
Frontier Technologies	274	73
General Signal Networks		68
Global Internet		47
Hummingbird Communications		44
Hypercom Inc.		57
I8M		13,15,26,87
Intel Corp		24-25
Lucent Technologies		58-59
MaxNET	267	72
Memotec Communicatio		22
Micom Communications		54
Mier Communications		83
NetManage Inc.		10
Networks Expo		85
Newbridge Networks		36
NORTEL		9
Novell Incorporated		31
Nuera		4
OpenConnect Systems		46
RADCOM	300	76
Shiva		28-29
SilCom Manufacturing	269	76
Standard Microsystem		11
Sync Research		66
*TCG		42-43
Texas ISA	230	74
TODD Enterprises Inc	266	76
Unisys Corp		41
Verilink Corp		20
West Hills Lan Systems	297	77
White Pine Software		62
Xylan Corp		61

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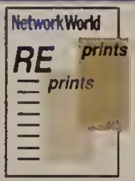

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LDAP

Continued from page 1

based directories.

The question on everyone's mind now is: Can other users reap the same type of benefits once Netscape and others start integrating LDAP support into their operating systems, messaging services and directory-enabled applications?

What's in a name?

LDAP	Lightweight Directory Access Protocol – A simplification of the X.500 directory access protocol; provides a mechanism for clients to query and manage a hierarchical directory database over TCP/IP.
LDAPD	LDAP daemon – Provides a gateway that gives LDAP clients access to an X.500-based directory service.
SLAPD	Stand-alone LDAP daemon – A directory server that runs on several types of Unix machines, contains its own directory database and can provide access to other global X.500 directory services.
SLURPD	Stand-alone LDAP update replication server – LDAP server software that provides replication of changed directory information between master LDAP servers and multiple slave LDAP servers.
maX.500	Graphical LDAP client software for Macintosh machines.
waX.500	Graphical LDAP client software for Windows 95, 3.1, and NT 3.51 machines.
xaX.500	Graphical LDAP client software for Unix-based terminals running X Windows.
UD	Text-based LDAP client for Unix machines.

SOURCE: UNIVERSITY OF MICHIGAN, ANN ARBOR

Netscape, which wooed away most of the university's LDAP team to work for the company, thinks so and is poised to deliver the industry's first LDAP-based directory server any day now (see story, this page).

Tim Howes, former project leader of distributed directory services at UMich and now a directory server architect at Netscape, is largely credited with advancing the LDAP concept.

In 1989 — to accommodate exploding E-mail usage at the university — Howes envisioned building a distributed directory service based on the ISODE X.500 specification. But he strove to give users directory information access without the huge overhead involved in using the Directory Access Protocol.

What arose from this ad hoc development was a protocol called Dixie — the direct precursor to the version of LDAP that would be widely published by and implemented at UMich.

"We never intended for Dixie to become a standard, but based on the early success we had [at the university], we thought a standard version should be developed, and this led us to LDAP as we know it now," Howes said.

LDAP was first proposed as a standard to the Internet Engineering Task Force in 1991.

The first LDAP implementation at UMich was an LDAP daemon (LDAPD) used as a front-end gateway to an X.500 directory server.

Lance Sloan, the engineer who currently heads up the distributed directory service at UMich, said the need for LDAP servers shot up drastically about two years ago when the university installed an Internet Message Access Protocol-based E-mail routing system.

Under this scheme, E-mail addresses can be long and complicated. But the LDAP directory service simplifies the process by storing the complex addresses as attributes so end users can send a message to someone at the university via a simple address defined as name@umich.edu.

Link these LDAP resources online:

- ● A protocol overview
- ● A list of available client software
- ● A guide to LDAP server configuration

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Not only were people receiving more E-mail, they were becoming more aware of the types of information available to them via the directory services, Sloan said. As users began accessing the directory more frequently, the IS department had to deploy additional LDAP servers.

It got to the point where the IS department was running out of names for the servers, which are named after Arnold Schwarzenegger films.

"We wanted to name each LDAP server after a powerful, gutsy movie like 'Total Recall,' 'Judgement Day,' 'True Lies' and 'Red Heat.' But the directory service grew quickly, and we ran out of good names so we had to use 'Twins' in the end," Sloan said. 'Terminator' was reserved for the server used for LDAP development work, he added.

While each directory server has a unique name, they all share the same network address. This scheme provides for better end-user response time because all five servers answer LDAP client queries in rolling order, Sloan said.

LDAP ADDS UP AT THE UNIVERSITY OF MICHIGAN

- ▶ 115,000 entries in the directory
- ▶ 50,000 end users of the directory
- ▶ 5 million accesses per week
- ▶ 100,000 writes per week
- ▶ 15,000 groups/lists in the directory
- ▶ 300M bytes of directory data on disk

SOURCE: UNIVERSITY OF MICHIGAN, ANN ARBOR

With this initial implementation up and running, LDAP development moved forward with several goals in mind, Howes said.

"We wanted to make it easier to deploy LDAP on an Internet scale, populate an LDAP directory with information, integrate LDAP in an existing computing infrastructure, and administer user, group and other directory information," he said.

Armed with a grant from the National Science Foundation, the UMich team developed a stand-alone LDAP (SLAPD) directory server that runs independently of an X.500 back end, and a server technology that provides updated replication services between SLAPD servers that were published earlier this year.

These advancements simplified directory management. By removing ties to an X.500 directory server, overhead is streamlined and a single point of administration emerges. Replication automates the process of maintaining distributed LDAP directory servers and provides a level of fault tolerance should the primary LDAP server go down.

While Sloan said the university has plans to migrate its directory service to a SLAPD model in the future, he is maintaining the five Schwarzenegger LDAP servers connected to an X.500 back-end for now.

Sloan manages the directory system now using a compilation of homegrown Unix command line tools and several utilities that offer graphical views of the hierarchical LDAP directory tree.

He can search for, modify, delete and add directory information for users and network services.

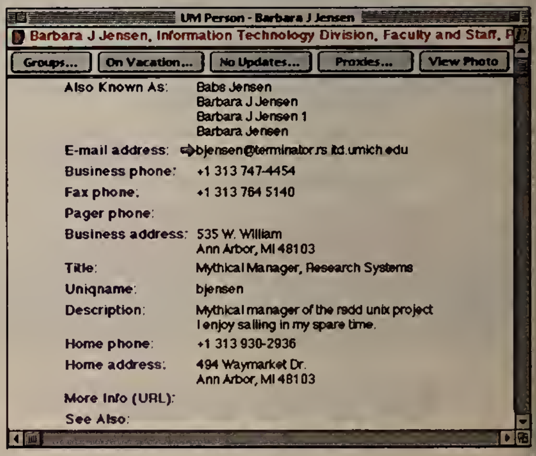
LDAP-enabled apps

What started at the university as an initiative to give users an easy way to access directory information has grown to encompass several LDAP directory-enabled applications. The LDAP directory is used to provide an address book application that gives end users access to information beyond E-mail addresses, such as phone and fax numbers as well as university and home addresses.

Additionally, UMich uses the LDAP directory service in some of its software licensing applications, for security purposes in remote computing sites and for student registration.

The University of Michigan has proven that LDAP works for its end users. But for LDAP to work for network administrators on a wider scale, operating system and directory service vendors have to start putting LDAP support in their products soon.

Jamie Lewis, president of the Burton Group in Midvale, Utah, said vendors are getting a lot of pressure from users to move toward this interoperability standard.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The maX.500 client software *lets an end user browse the LDAP directory tree as well as view public information about other end users contained in the directory.*

"As long as that pressure is on, a common denominator for interoperability will be created through open standards like LDAP," Lewis said.

Sloan agreed. "The LDAP directory works great for us here, and with all the weight of the industry behind it now, it's inevitable that it will take off in the corporate world," he said. ■

Netscape readies LDAP server

Netcape Communications Corp. has wasted little time in taking advantage of the Lightweight Directory Access Protocol (LDAP) experts it wooed away from the University of Michigan last spring.

Netscape is poised to release any day now Directory Server 1.0, the industry's first LDAP-enabled directory server. The company is also on track to deliver LDAP support to its Navigator Web browser by year-end and the next release of its SuiteSpot server suite by early next year.

Key contributors to the effort have been Tim Howes, who was the lead LDAP developer at the University of Michigan at Ann Arbor, and two of his university colleagues. Howes is now Netscape's Directory Server architect.

The Netscape Directory Server will become a cornerstone of Netscape's SuiteSpot server product line, Howes said. "It provides the glue binding the components together into a manageable whole," he said.

Using the replication service and client-to-server model developed by Howes and his LDAP team while at the university, Directory Server will enable administrators to deploy a cross-platform intranet/Internet directory service.

Data entered into the server can be replicated to any future LDAP-compliant NOS- or application-based directory, creating a single structure across the enterprise. Likewise, LDAP-compliant agent software running on other directories — such as Novell, Inc.'s Novell Directory Services and Banyan Systems, Inc.'s StreetTalk — will be able to update information in Directory Server.

Directory Server 1.0 is expected to cost less than $1,000 and run on Windows NT and several major Unix platforms.

— *Christine Burns*

Netscape

Continued from page 1

arch rival Microsoft Corp., sources familiar with the plan disclosed.

To date, the 2 1/2-year-old Mountain View, Calif., software company has been reticent to embrace Microsoft's ActiveX technology. But that hard line apparently is about to soften, as Netscape pledges to integrate its products with many of the competition's core offerings, including ActiveX and Office 95 and 97, and extend support for SQL Server and Systems Management Server, sources said.

Netscape also plans to unveil a Communicator standards-based groupware client — intended to compete against Microsoft's Exchange and Lotus Development Corp.'s Notes — that features five components in the standard version:

■ Navigator 4.0 Web browser (due out by year-end).

■ Messenger, an open-standards E-mail client that allows users to compose messages in HTML and employ the Lightweight Directory Access Protocol to look up addresses and digital IDs for people inside and outside a corporation.

■ Collabra, for collaborating with others through discussion and newsgroups.

■ Composer, a new version of the Navigator Gold Web authoring tool.

■ Conference, for making telephone calls over the 'Net using CoolTalk technology.

Components can be used separately or plugged into other applications.

"Now it's not the browser battle; it's this package of stuff, and the browser is one piece," said one industry source. "Will people migrate toward this componentized suite of applications on top of your desktop? Or will they go the other way and go down into the desktop with Microsoft?" Microsoft later this year will release a version of Windows that fully meshes browsing and file management.

The standard Communicator product, due out in the first quarter of '97 with all the new bells and whistles, will sell for $49, the same price as the current Navigator client, sources said.

A Professional Edition, which will sell for $79, tacks on calendaring and scheduling, as well as an AutoAdmin management tool for administrators to set user privileges, sources disclosed.

In a neat and tidy fashion, Netscape also will directly match its SuiteSpot 3.0 server line to the different Communicator components, sources said.

For instance, a messaging server will map to the messenger client component. Other servers mapping to Communicator's collaborative applications will be a media (for streaming audio), calendar, Collabra and an enhanced enterprise Web server, sources said.

Rounding out the 10-piece server line will be catalog, certificate, directory and proxy servers, plus a LiveWire Pro development/Web site management tool.

Currently, the company's SuiteSpot server software line consists of mail, news, proxy, catalog and enterprise Web servers. Customers can buy them separately for $995 or any combination of five for $3,995. The LiveWire Pro management tool comes free with SuiteSpot and can be tacked on separately for $695.

That pricing will still hold, but Netscape also will institute some per-user-based pricing, sources said. SuiteSpot customers who choose any of the collaborative server pieces that map to Communicator (other than the enterprise server) will get 100 client licenses included.■

The great Communicator

Netscape's Communicator components:

- ▶ Navigator 4.0 Web browser
- ▶ Messenger mail
- ▶ Collabra for discussion groups
- ▶ Composer Web authoring tool
- ▶ Conference for placing phone calls
- ▶ Calendar*
- ▶ AutoAdmin for management*

Standard Communicator, with first five components, will cost $49.

*Comes with Professional Edition, which will sell for $79.

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Consolidation

Continued from page 1

San Francisco.

It is easier for a Cisco, 3Com or IBM to just lay out millions or billions of dollars for people, products and ideas rather than start their own operations from scratch, observers said.

"You don't have enough people to staff all of the projects that you want to put on," said Geoff Yang, general partner at Institutional Venture Partners in Menlo Park, Calif.

"If you can acquire a company where you have a hole in your product line and do double or triple in revenue what they could do independently, then you can pay for this thing in a year," Yang said.

It is also better to snap up a company quickly because if you don't, a rival will.

"Cisco bought Granite [Systems, Inc.] clearly to take it out of play," said Todd Dagres, managing partner at Battery Ventures in Boston, referring to the recent $220 million purchase of the Gigabit Ethernet start-up. "This may be a hot area, and it's a gap filler."

Indeed, the ability to fill that gap could translate into a do-or-die situation for a company. A vendor that is four to six months late to market with a product misses more than 50% of that product's life cycle and revenue potential, said Charlie Federman, chairman of Broadview Associates in Fort Lee, N.J.

"The 50% you miss is the juicy 50% that has the higher margins," he said.

Don't stand a chance

From the standpoint of the acquiree, some admit they do not stand a chance of gaining a foothold in their targeted markets without the help of established players.

The market has changed so much in the past 10 years that it is harder for start-ups to go solo cradle-to-grave due to the costs of building distribution and after-sale support infrastructures, said Bill Seifert, chief executive officer of Agile, one of three companies he has founded.

"We now have a world dominated by a handful of really big players, and it's necessary to have some big partners," he said. "In this case, the partnership arrangement happened to involve selling all the assets to Lucent."

But is all of this consolidation really good for the end user in the long run? Is there a chance that companies become so big they lose their competitive agility and innovation? Do they become so dominant they start dictating what the end user buys and installs?

Customers are split on these issues.

"The more companies are bought up, the more difficult it is to have negotiating leverage on software," said Jerry Krauss, senior director of operations and technical support at Avon Products.

But others say product purchasing becomes easier.

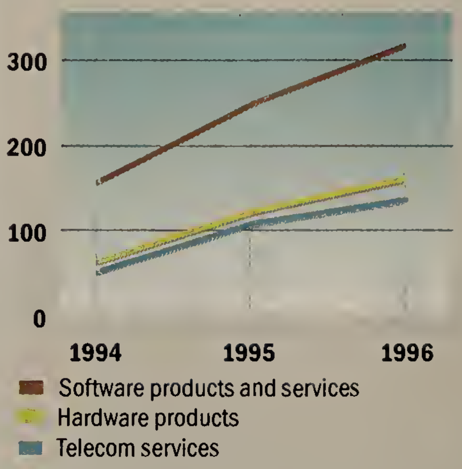
"If you've got five billion companies all with a product out there, there's five million individual proprietary things that don't talk to each other or have different nuances," said Erik Goldoff, computer specialist at the Centers for Disease Control in Atlanta. "If it narrows down to maybe 12 or 15 really good products, [it's easier] to make a well-informed decision."

Senior Writer Chris Nerney contributed to this story.

ALL TOGETHER NOW

North American IT industry mergers and acquisitions are on the rise.

(Number of transactions)



SOURCE: BROADVIEW ASSOCIATES, FORT LEE, N.J.

Backbone

Continued from page 1

■ A true X.500 directory.

"We felt that [an enterprise messaging switch and X.500 directory] were essential to support our legacy systems, and a pure Exchange system did not offer that," said Carrolle Pearson, manager of site services for the space and strategic missiles sector at Lockheed Martin Corp. in Sunnyvale, Calif.

"Lots of changes we are making in Exchange 4.5 are aimed at the 100,000-plus-seat customer."

Greg Lobdell, group product manager at Microsoft

Lockheed last month said it will migrate 120,000 users to Exchange from a mix of mainframe- and LAN-based mail, but will rely on Digital's mail backbone and X.500 directory. Exchange will be the departmental message store and the mail client.

The idea of setting up Exchange in a two-tiered architecture made up of backbone technology and Exchange servers is sound, particularly with the first-generation Exchange 4.0 version, some early adopters said.

"Exchange is really not optimized for a multisite environment yet, and we need to keep our connectivity to our users no matter what mail system they use," said a manager of messaging at an insurance company that will move more than 30,000 users to Exchange. The company plans to keep its existing Worldtalk backbone in place, at least during the migration.

Another early adopter, moving more than 100,000 users, plans to use Exchange to support all E-mail traffic. But the company will wait until Exchange 4.5 ships later this year.

Analysts and integrators said the Exchange experience is not unique. "Client/server systems don't yet encompass the necessary backbone components," said one Microsoft Solutions provider who requested anonymity. "At least for the time being, you can go ahead with Exchange at the department level, but you'll need some other technology, as well," he said.

Even Digital is maintaining its existing X.500 directory infrastructure and X.400/SMTP backbone during its Exchange move.

Not all the Exchange early adopters agreed with that approach. "We use Exchange for a messaging backbone," said Ned Studt, systems engineer at the Kentucky Department of Education in Frankfort, which is installing about 200,000 Exchange seats. "I think most of those preexisting [backbone] products are kept in place because of the significant investments that companies make in them," Studt said.

Determining whether or not to lean on third-party backbone technology seems based on what the environment already looks like. Lockheed, for instance, had a large X.500 legacy backbone and acquired more X.500 backbone components when it bought Loral Federal Systems.

"For them, it made sense for the time being to keep that X.500 backbone in place and use [Digital] Mailbus," said Greg Lobdell, group product manager at Microsoft.

According to Lobdell, several companies — including The Boeing Co., Chevron Services Co., Texaco, Inc. and Microsoft itself — currently use Exchange as a messaging backbone, and that, over time, more customers will do the same. ■

Bracing the backbone

Several enhancements to Exchange 4.5, due later this year, are expected to make the client/server messaging system easier to deploy across corporate networks.

The focus of that release is support for several Internet protocols — including the Post Office Protocol, Simple Mail Transfer Protocol and Lightweight Directory Access Protocol — for Exchange, according to Greg Lobdell, group product manager at Microsoft Corp.

However, Version 4.5 is also expected to let users run Exchange in a more distributed architecture by allowing administrators to create sub-sites, he said. This means users at different physical sites can be grouped together for administrative purposes, a notion similiar to virtual LANs.

"The work we are doing with sub-sites and making our directory easier to manage will help support the 100,000-seat customer," Lobdell said.

–Barb Cole

Cisco

Continued from page 1

eotape of a boxing match in which the lean, sculpted Cabletron Crusher pummeled the old, flabby Cisco Kid into submission.

Cabletron licenses IOS for routing modules that fit into Cabletron switches and hubs. The company sells about $7 million worth of these modules annually.

Cabletron claims, due to recent acquisitions, it will now be able to offer its own routing technology to fill the IOS gap.

Cisco notified Cabletron the week of Sept. 30 of its intention to terminate relations with its six-year IOS business partner.

At press time, Cabletron President and CEO Robert Levine was scrambling to patch things up with Cisco, a Cabletron spokesman said.

Customers and analysts disapprove of Cabletron's conduct. "It's a shame but not unexpected," said John Scoggin, chief technical advisor at Delmarva Power in Wilmington, Del. "I would have done the same thing [as Cisco]. It was an immature display."

"It sounds like somebody stepped outside the lines and is getting spanked," said Virginia Brooks, director of network research at Aberdeen Group, Inc. in Boston. "It's really the second-class citizens that do their marketing at the expense of their competition."

Cabletron officials said they are disappointed with Cisco's action but not embarrassed. They said their marketing tactics are no different than other company's.

"We stand behind the argument that we were making of the value of virtual networking and the value of our switching platforms [vs. routers]," said Wade Appelman, director of advanced product engineering at Cabletron. "We [offered IOS] purely as a convenience to our customers. It really hurts the Cabletron and Cisco customers." ■

"It sounds like somebody stepped outside the lines and is getting spanked. It's really the second-class citizens that do their marketing at the expense of their competition."

Cabletron

Continued from page 6

ny's installed base," said David Raezer, an analyst at Montgomery Securities, a financial firm in San Francisco.

Previously, customers were forced to turn to Cabletron competitors, such as Cisco Systems, Inc. and Ascend Communications, Inc., for remote access gear. But recent Cabletron acquisitions of ISDN provider Network Express, Inc. and frame relay vendor Netlink, Inc. have given the company remote access and WAN technology in-house.

What's Willow?

Willow, Cabletron's new remote access module, will offer a minimum of four interfaces that each can support as many as 30 ISDN or 976 frame relay connections. This means that customers of Cabletron's 14-slot Multi Media Access Center (MMAC)-Plus switching chassis will be able to provide as many as 56 WAN interfaces per chassis, according to Brian Barton, remote access program manager at Cabletron.

The chassis can provide such a high number of connections because of its speedy backplane, industry observers said. Cabletron's Cell Transfer Matrix backplane boasts more than 75G bit/sec of switching capacity.

While many customers do not require such a high-end system, Cabletron expects large corporate users, telephone companies and Internet service providers to find the offering attractive. In fact, the new device signals Cabletron's first big push into the carrier and ISP market.

The MMAC-Plus remote access module is expected to ship in the second quarter of 1997. Pricing has not yet been set.

CyberSwitch pitch

As expected, the CyberSwitch products introduced last week consisted of stand-alone devices for the central site as well as the branch/remote office and small office/home office (*NW*, Oct. 7, page 6).

For the carrier, service provider and large corporate markets, Cabletron rolled out the 16-port CyberSwitch 7000 remote access switch. The company also unveiled a slew of products for the branch/remote office, including the eight-port CyberSwitch 6000.

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NetworkWorld

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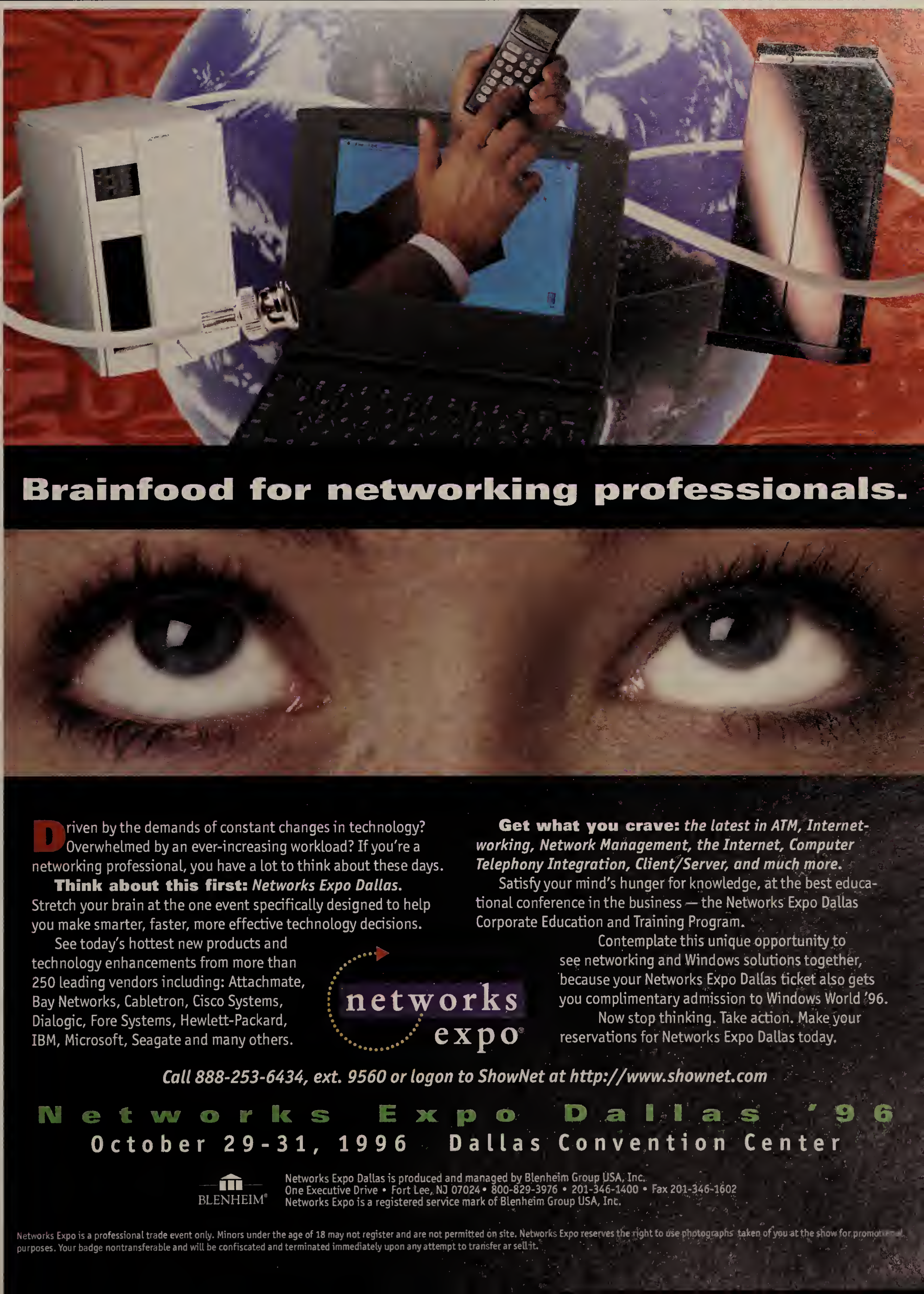

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Professor Gibbs online: marketplaces, trade shows and dialogues

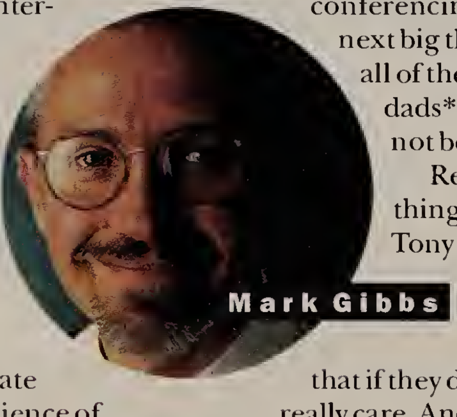
Welcome to 'Net Marketing 102: Doing it right.

Do you talk with your prospects and customers or at them? If you've done any selling, you will already know that talking at them is less effective.

While we may understand this in the real world, most Web sites, and the sales and marketing people behind them, don't seem to realize that the same issues apply online.

My friend Tony runs a company specializing in renting hand-held radio systems. On average, his Web site (www.radiolink.com) receives a couple of messages each day asking for information about radio systems.

This is a good thing (as Ms. Stewart would say), and conventional wisdom would suggest that since these people came to his site and were interested enough to ask for information, they represent solid leads. They have *selected themselves* as prospects, and they should be assumed to be *real prospects*.


Mark Gibbs

This is the fundamental issue of Internet marketing: On the 'Net, you have to plan to communicate with individuals — an audience of one. This is fine, as we say here at the Gibbs Institute, jim-dandy*, but given the technical limitations of the 'Net and the Web at present, it is pretty hard to do.

So Tony is handed, in theory, a couple of one-person audiences each day. What should he do? Should he pay close attention to their messages and respond directly to them? When the prospects ask for information, should he send it by E-mail or snail mail?

When Tony first started getting inquiries through his Web site, he followed conventional wisdom and responded in a focused, detailed manner by E-mail and, when required, by snail mail. He often heard nothing more from the interested parties.

Now it is unlikely that his company's services were deficient in some way (in the radio system rentals market, he's one of the biggest operators). I suspect that these inquirers were the Internet equivalent of the paper collectors you see at trade shows.

Gibbs' Second Law reads: Until you have a dialogue, you don't have a prospect.

Which leads me to Gibbs' Observation about Online Marketing: The Internet is more like a trade show than a marketplace.

In a marketplace, there's interaction between buyers and sellers — a dialogue occurs. At a trade show, there's usually very little in-depth dialogue. It is a paper-collecting, pitch-absorbing exercise, altogether a much more passive experience than a marketplace.

Until Web sites and the Internet allow for much greater levels of interactivity, such as very good video delivery, real teleconferencing (which will be the next big thing on the 'Net) and all of the other hot doodads** we want, the 'Net will not be a real marketplace.

Recognizing that something was not quite right, Tony started sending a response to each inquiry to start a dialogue. He reckoned that if they didn't reply, they didn't really care. And it worked. He finds that those who do reply are serious, and he often does business with them. He also saves money by not sending out paper collateral by snail mail.

From this example, we can extract Gibbs' Second Law of Online Marketing: Until you have a dialogue, you don't have a prospect. A dialogue establishes the foundation of assessing the prospect's needs and starts to build a relationship.

So before you spend lots of time responding to all of the apparently hot leads your site is generating and sending out product information by snail mail, establish a dialogue.

Class dismissed.

Professor Gibbs is in his virtual office for student consultations at prof.mgibbs@gibbs.com, or call (800) 622-1108, Ext. 504.

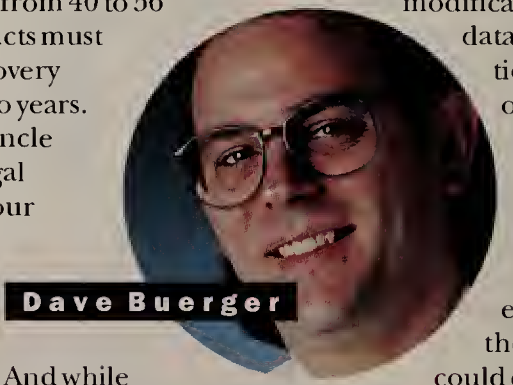
* I have one of my famous "But I digress..." shirts for the first person to send me a convincing etymology of "jim-dandy."

** And another shirt for the origin of "doo-dad."

New encryption export policy is a cruel slap in users' faces

The White House just doesn't get it. After striking out three times with flawed proposals to control encryption software, it recently announced a fourth plan to "liberalize" export controls for commercial encryption products.

It's the same old saw. Under the new plan, legally exportable encryption software keys will rise from 40 to 56 bits. But all products must support a key recovery scheme within two years. In other words, Uncle Sam still wants legal power to access your secrets.


Dave Buerger

Encryption is just one part of securing corporate information. And while some high-tech CEOs are endorsing President Clinton for reelection, information systems professionals are not cheering the quality of commercial security products.

Last week at Gartner Group, Inc.'s IT conference in Orlando, Fla., I listened to analyst William Keyworth discuss network and systems management. When he queried the audience, nearly all of the several hundred IS managers said they use a firewall. But less than 10 said the firewall makes them feel secure.

Security technology has failed to make people feel good about the safety and integrity of corporate data.

Keyworth then said 80% to 90% of security breaches are inside jobs. His caveat did not make the audience feel better. Security technology clearly has failed to make people feel good about the safety and integrity of corporate data.

A major information technology users' group also gave protection alternatives a big thumbs-down last week. The Chicago-based Open User Recommended Solutions (OURS) group released a white paper that paints a grim view for security on the Internet.

The paper, "Recommendations for Providing Secure Business Services Over External Networks," evaluated security alternatives for conducting business on unsecured networks such as the Internet. The paper recognized three common business Internet activities: advertising and marketing; electronically transmitting data or image files; and conducting electronic commerce or business transactions.

And it offered a matrix for identifying nine critical threats to these activities. Threats included destruction of data, interference with data transmission, modification or replacement of data, use of false data, repudiation, or after-the-fact denial of a business action, misuse of data; unauthorized access, unauthorized use and unauthorized disclosure of information.

The paper's task force evaluated 33 tools to thwart these threats. Each one could earn one of the following classifications:

- ■ Strong, which makes the threat or consequence extremely unlikely or impossible
- ■ Basic, which prevents the threat or consequence under normal circumstances
- ■ Limited, which reduces the threat or consequences or improves detection
- ■ No level of protection

The evaluation results were abysmal. Three-fourths of the tools provided limited or no level of protection. Just 14% provided basic protection and only 10% were judged to be strong.

No wonder users are nervous about protecting corporate data.

The paper's task force included representatives from American Express, Chase Manhattan Bank, Bellcore, Levi Strauss, Motorola, Pacific Gas & Electric, Phillips Petroleum, SunTrust Banks and Union Camp. An executive summary will shortly be posted to the OURS Web site (www.ours.org).

The White House and law enforcement agencies blame the need for their policy on criminals and terrorists. Yet even the CIA can't keep ordinary hackers from sabotaging its home page.

The relatively miserable quality of data security products makes the new encryption policy reprehensible. Users need more security, not less. Let's hope the administration comes to its senses with a more reasonable plan for encryption export.

Buerger is a networking industry consultant and writer in Atlanta. He can be reached at dave@buerger.com.

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